the OIL AND GAS JOURNAL

economics

BEHIND YOUR CHOICE

OF ROCK BITS

In oil well drilling, the margin between *profit* and *loss* may frequently be the difference in the performance of the rock bits you use. That is why so many operators today select Hughes bits in setting up bit programs for their wells. They know from experience that in established areas they can project drilling costs from the performance of Hughes bits.

Let the Hughes representative in the area in which you are operating help you set up the bit program on your next well. He is familiar with the bits that can get you on and off the job in the shortest possible time.

PRICE 50 CENTS

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MARCH 29, 1954

"What else need be said?"

CEMENTING

HALLIBURTON OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES

the OIL AND GAS JOURNAL

MARCH 29, 1954 VOL. 52 NO. 47

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In Brief . . .

1. BETTER WATER DISPOSAL . . . Wastewater disposal system of General Petroleum's Torrance, Calif., refinery has been completely revamped. The treating facilities were vastly overloaded due to continued plant expansions and addition of more complex processes.

Resulting waste-water purification plant is probably the most modern of any in the country. Such an efficient cleaning job is being done that it is planned to reuse about two-thirds of the volume now being dumped into the Los Angeles County waste-water disposal system.

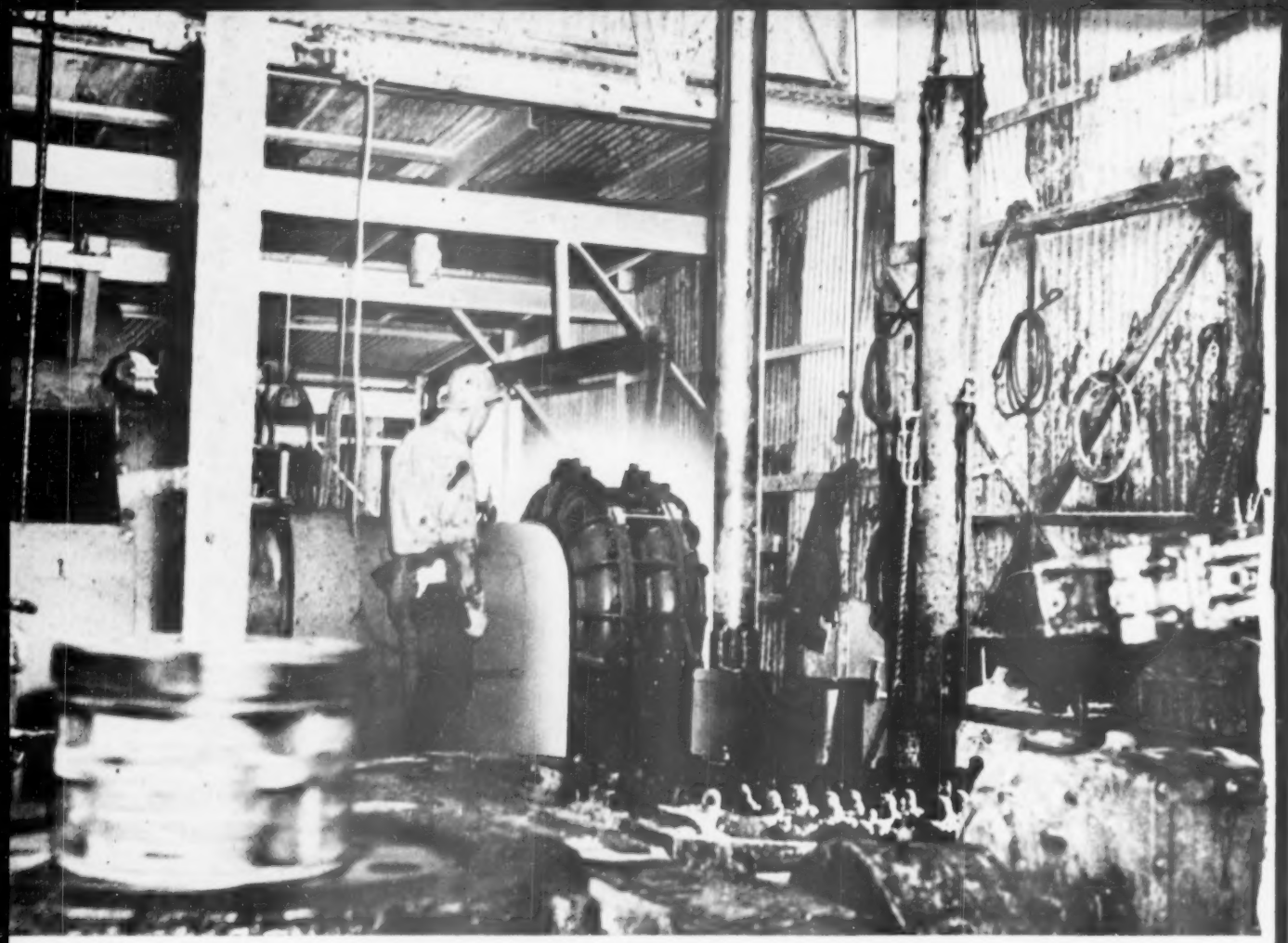
Principal innovation of the new system is an underground skimming pit on which a vacuum is maintained by means of conventional vapor-recovery equipment. Chemical treatment of the raw water and filtration of the resulting sludge in a precoat rotary filter is accomplished almost entirely automatically.

2. CHEAPER DRILLING . . . Oil-base-emulsion drilling and completion fluids have been used in over 400 wells in the past 3 years. Superior completions are claimed for their use, and they have replaced costlier completions in many fields. Besides yielding high completion and long-time productivities, the oil-base-emulsion fluids are inert to the usual contaminants and can be compounded to low mud weights when desired.

Improved oil-base-emulsion muds are now available which suspend cuttings and which do not cause hydratable material to swell.

3. MORE GAS RESERVES . . . Proved gas reserves in northwestern New Mexico have increased appreciably since January 1, 1953. This increase has been due mainly to the extension of already existing gas fields in the area. There has been a 15 per cent increase in proved oil reserves since January 1, 1953. This increase has been due mainly to the discovery of new oil pools in this area.

4. GAS-LIFT SERIES . . . The Journal is here initiating a series on the Fundamentals of Gas Lift. The phenomenal rise in the economic value of gas has greatly increased the number of gas-lift installations at the economic border line. This series will cover as thoroughly as possible all aspects of the design of individual gas-lift installations, with emphasis on gas conservation.



SAFETY for the world's longest string of Drill Pipe insured by PARKERSBURG HYDROMATIC

Here's proof that Parkersburg Hydromatic Brakes are fully capable of handling the "deepest wells being drilled today."

This 40" Double Rotor Hydromatic on Ohio Oil Company's 21,482 ft.-plus well in the Paloma Field, California, lowers the world's longest and heaviest string of drill pipe with the utmost safety.

You can have full confidence in the braking power of Parkersburg Hydromatics. With an uninterrupted supply of water it is almost impossible for anything to get out of order or for the brake to fail. It is not dependent on supplementary or outside power . . . requires no specially trained man to keep it in operation.

Hydromatic braking power is constant under the same load and speed, but automatically increases to meet any sudden increase in speed. A simple manual adjustment is all that's required to increase braking power when it's needed.

Parkersburg Hydromatic Brakes cost less to buy . . . practically nothing to operate and maintain. No modern rig is complete without one.

No. 5409

PARKERSBURG
OIL FIELD EQUIPMENT

The Parkersburg Rig & Reel Co. Parkersburg, West Virginia
Division of Parkersburg-Aetna Corporation

You get MORE CAPACITY with a FANMIX BURNER

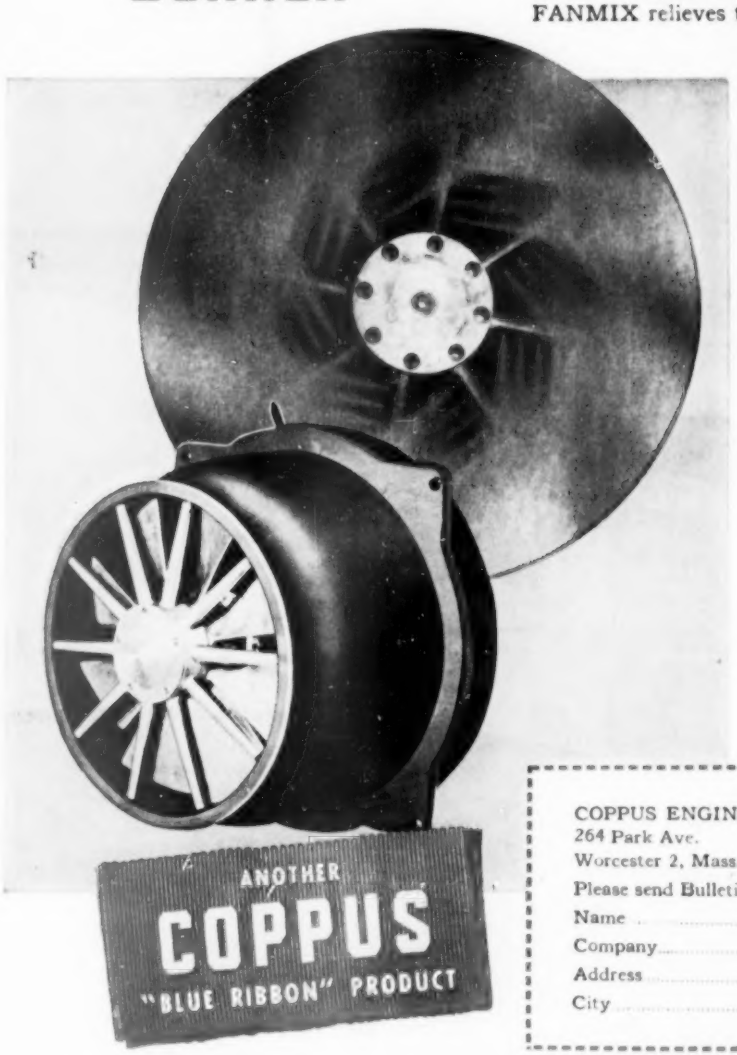
Increase Boiler Ratings On Present Or Planned Equipment

In all types of Coppus-Dennis FANMIX Burners — straight gas or combination gas-oil — we utilize the energy of the fuel under pressure to drive the burner fan and deliver air in the proper proportion to the fuel flow. This exclusive "pinwheel action" *mechanically* mixes fuel and air in exactly the right proportions for truly radiant, non-luminous heat.

The result is uniform temperature everywhere in the combustion chamber — no drifting "hot spots" — and complete combustion under all conditions. That's why you can release more heat into your present furnace — why in new installations you get more heat into smaller furnace space.

FANMIX Saves On Both Old and New Installations

FANMIX can easily be operated with your present furnace and stack, requiring only minor changes in other equipment. Or if you're planning on new boilers, remember that FANMIX relieves the furnace from the burden of mixing, creates its own forced draft and takes smaller pipe sizes. Which means you can plan on reduced combustion space, less stack, no forced draft equipment and lower installation costs all around.



Get the Whole Story

Coppus engineers FANMIX Burners to meet individual requirements, providing complete control over heat pattern and combustion . . . Learn more about how "pinwheel action" can step up *your* boiler performance to peak efficiency and economy — as it is doing throughout industry. Send for Bulletin 410-6. Coppus Engineering Corp., Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" Products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, and MINING CATALOGS.

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Worcester 2, Mass.
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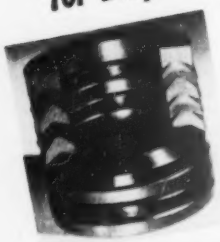
City ..... Zone ..... State .....

5 GOOD TIPS

for Better Performance with Less Maintenance of your "Oilwell" and Wilson-Snyder Slush Pumps

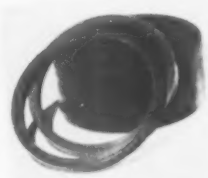
Piston Rod Packing for Diaphragm and Stuffing Box



Pressure-seal stuffing box packing is manufactured to "Oilwell's" exacting standards from molded duck and synthetic oil-and-water-resisting composition and packaged in combination sets with alternating Buna-N rings. Floating oil seals in the diaphragm have lips turned in opposite directions to seal in lubricants and seal out foreign matter.

USE "OILWELL" PARTS FOR "OILWELL" PUMPS

Liner Sealing Rings for "Tell-Tale" Liner Packing



The two replaceable sealing rings which are separated by a metal lantern ring, have a flexible core of special rubber compound encased in an oil-and-water-resistant duck compound molded together under high pressures and temperatures to resist extrusion from liner spacer adjustments under severest service conditions.

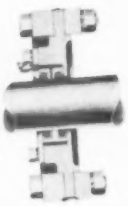
Cylinder Head and Valve Cover Gaskets

. . . for larger pumps are hot-molded from duck with an oil-and-water-resisting compound, impregnated throughout. This results in a tough, hard-yet-pliable gasket that will take highest load pressures.

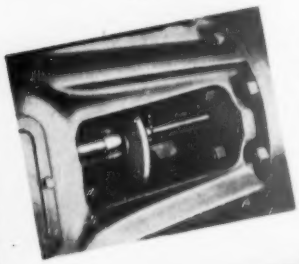
USE "OILWELL" PARTS FOR "OILWELL" PUMPS

Parts for Diaphragms and Stuffing Boxes

All parts for fluid piston-rod stuffing boxes and diaphragm stuffing boxes can and should be replaced when worn or damaged to insure effective packing performance.



Flexible Mud Baffles



. . . prevent mud or water from traveling along rods to damage diaphragm packing at the power end. They can be installed or replaced in the field and do not interfere with stuffing-box-packing adjustments.

OIL WELL SUPPLY
DIVISION
UNITED STATES STEEL CORPORATION

Executive Offices—DALLAS, TEXAS
Export Office—
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Area Offices—
CALGARY, CANADA
CASPER, WYOMING.....COLUMBUS, O.
DALLAS, TEXAS.....HOUSTON, TEXAS
TULSA, OKLA.....LOS ANGELES, CALIF.

Branches Serving All Oil Fields

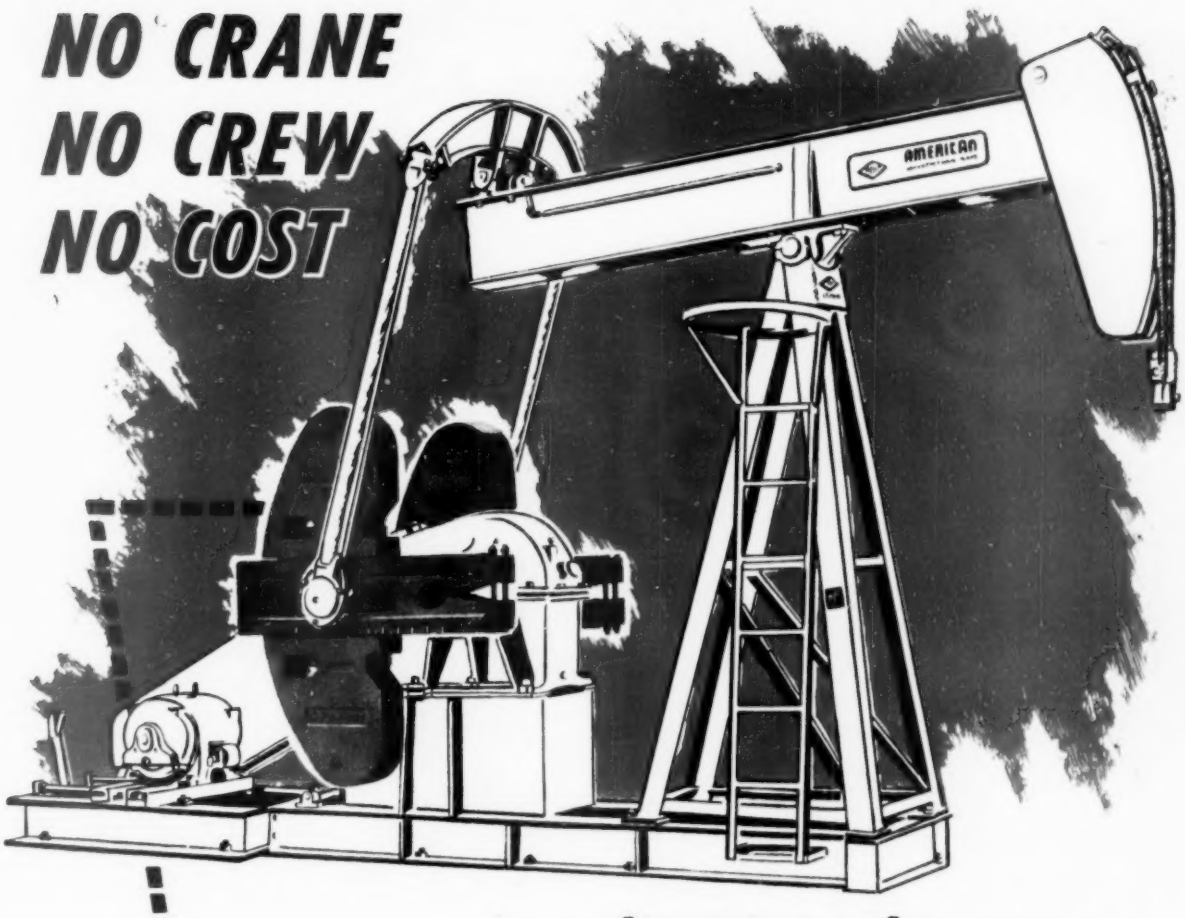
"OILWELL"

TRADE-MARK

USS TRADE MARK

UNITED STATES STEEL

NO CRANE
NO CREW
NO COST



...in adjusting the new
AMERICAN Counterbalance Crank

This new American Pumping Unit saves you operating time and money because it is a fast, easy one man job to adjust the unit counterbalance. Simply loosen two bolts that hold each master weight in position and turn the acme screw that moves the weight to the desired position. Yes, that's all there is to adjusting the unit counterbalance on the new American Pumping Units. Specify American and cut *Your* operating cost. Send today for free catalog or contact your nearest supply store or American Office.

AMERICAN MFG. CO. OF TEXAS

FORT WORTH 11, TEXAS

Houston • Kilgore • Odessa • Tulsa
Casper, Wyoming • Calgary, Alberta, Canada

The Oil and Gas Journal, published Mondays, copyright 1954, by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $4 yearly.

IN SPITE OF HIGH WATER

A CAT* SPREAD KEEPS ROLLING

HIGH WATER on the right-of-way has not bogged down this Bucyrus-Erie dragline powered by a rugged Cat D318 Diesel. Operating from wooden mats, the dragline continues to backfill the trench between Hawkins and Longview, Texas. Work is being done by O. R. Burden Construction Co., Tulsa, Oklahoma.

"Caterpillar equipment," reports R. M. Jones, superintendent on the job, "will last longer with less maintenance than any other equipment I've ever used."

This statement comes from experience. Up the line on this fast-moving spread, three D7s, a D8, a D8800 and a D318 are at work.

Standardization on Cat equipment is normal among pipeline men. It's normal because it's profitable. Money is earned because operators and mechanics need only know one make of machinery. Operators get more production out of it and mechanics spend less time maintaining it. Costs are cut because many parts are interchangeable. Parts inventory can be practically eliminated. And expenses fall with the use of low-cost No. 2 furnace oil. All Cat Engines burn it *without fouling*.

Ask your Caterpillar Dealer for the full, money-saving picture on standardization. Leading manufacturers of excavators, ditchers and compressors can furnish Cat Engines as original equipment. And, when it's time to re-power, it's time to see your Caterpillar Dealer.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

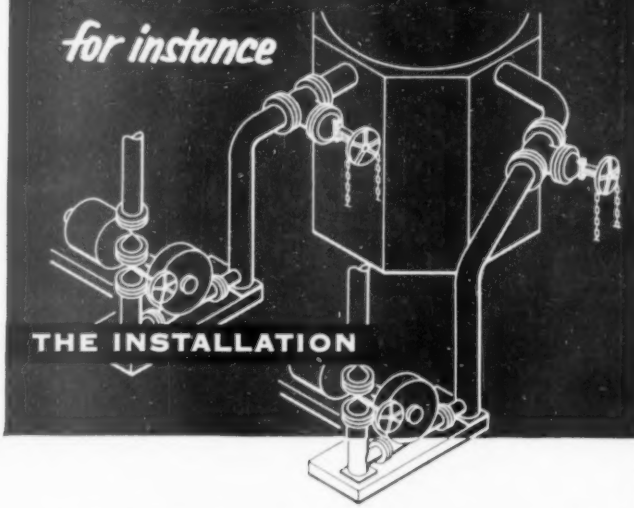
CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

A WORD TO THE WISE— STANDARDIZE!

You're Sure of Tighter Seating with Crane Steel Gates

...in a Butadiene Plant, for instance



THE INSTALLATION

At a Southwestern butadiene plant, using Crane 18-inch steel gate valves on suction lines from extractive distillation towers to pumps. Working pressure, 90 psi, 250 to 300 deg. F.

VALVE SERVICE RATINGS

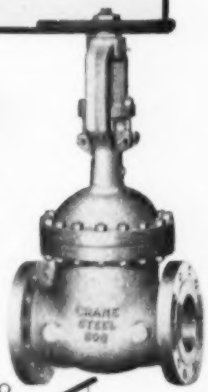
SUITABILITY:	Have what the job takes
FEATURES:	Expelloy seating
MAINTENANCE COST:	Zero
SERVICE LIFE:	Installed 1951-long life ahead
OPERATING RESULT:	Valve efficiency restored
AVAILABILITY:	Catalog item—No. 33X

THE CASE HISTORY

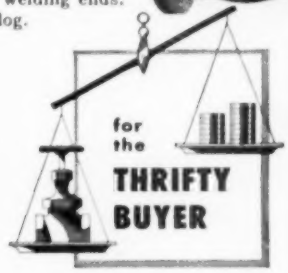
Original valves in this service were lubricated plug valves, but they couldn't be made to seat tightly on the light hydro-carbons and furfural mixture. Their continual leakage burdened the plant with excessive maintenance, and a constant threat to process control. All these lubricated plug valves were replaced with Crane 33X steel wedge gate valves.

Installed more than 2 years ago, the Crane valves completely remedied the leakage trouble, and to date, none have required any maintenance whatsoever. They keep working perfectly with but prescribed routine care.

THE VALVE



Product of pioneer skill in steel casting, and with a long record of service to petroleum and petrochemical industries, Crane steel valves stand apart from the ordinary. Yet they actually cost less for service delivered. Choose from the widest range of body and trim materials; in all pressure classes, sizes; flanged, screwed, or welding ends. See your Crane Catalog.



THE BETTER QUALITY...BIGGER VALUE LINE...IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois

Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

NEW

Axelson 6′ stroke hydraulic pumping unit

The Axelson Model H-100 answers the need for a pumping unit that has low initial cost coupled with trouble-free operation. An almost constant oil flow is possible because the unit combines a fast downstroke with a slow upstroke, thus increasing the volumetric efficiency of the sub-surface pump. Axelson's hydraulic reversal valve (patent applied for) assures a gentle reversal action which is easy on sucker rods.

CHECK THESE FEATURES:

TRIPOD BASE allows passing of the sub-surface pump by insertion of sub-couplings between the well and unit polished rod. One leg of the base is used for porting high pressure fluid, while a second leg carries discharge fluid from cylinder base back to the fluid reservoir. A very important feature of this mounting assures no contamination of the hydraulic fluid. A flange at the bottom of the tripod base forms the upper mating surface of a special Axelson casing head adapter. Adapters are available to fit any standard well head casing flange.

CYLINDER BASE may be called the "hub" of the unit. The unit tripod attaches to the bottom of the base, the cylinder into the top portion and the reverse valve assembly attaches to one side. Both power and exhaust fluids are ported through the cylinder base. An important feature is the ability to provide adequate pressure at lower reversal, which assures operation of the pilot valve. This is an asset particularly important on viscous wells.

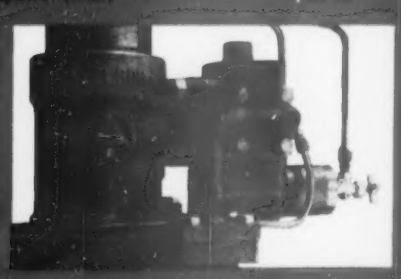
REVERSE VALVE AND PILOT VALVE are both hydraulically operated and the combination is simplicity itself in design. Only three pressure lines feed into the pilot valve. One is internally constructed to one end and two to the other end. Each of the pressure sources operates on different areas.

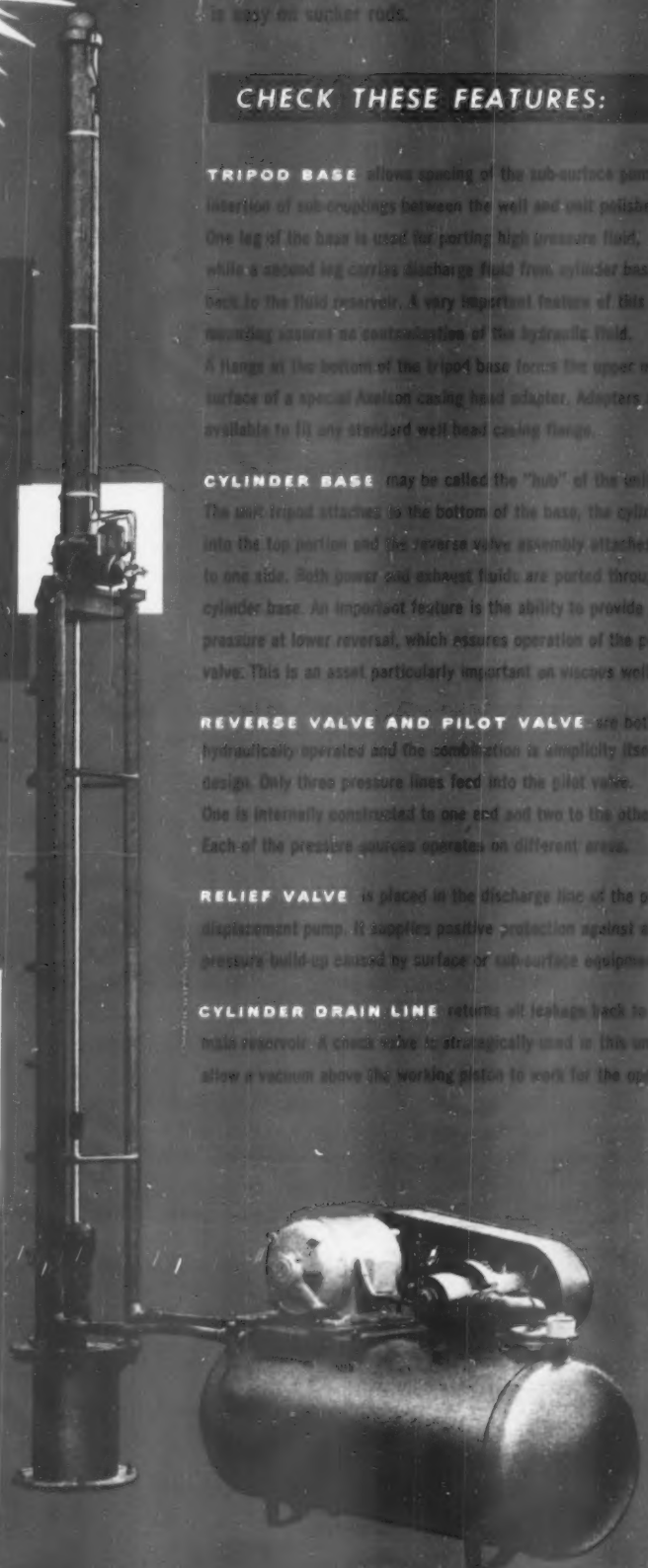
RELIEF VALVE is placed in the discharge line of the positive displacement pump. It supplies positive protection against excessive pressure build-up caused by surface or sub-surface equipment.

CYLINDER DRAIN LINE returns all leakage back to main reservoir. A check valve is strategically used in this unit to allow a vacuum above the working piston to work for the operator.

SPECIFICATIONS

Polished Rod Load (Max.)	13,000 lbs.
Stroke Length (Nominal)	6 Feet
Strokes Per Minute (Max.)	5.5
Upstroke Polished Rod Speed (Max.)	36 FPM
Pump	40 GPM
System Fluid (Approx.)	85 Gals.
Cylinder Diameter	5 Inches
Operating Pressure (Max.)	2000 PSI
Input Horsepower (Max.)	20 HP





AXELSON MANUFACTURING COMPANY DIVISION
PRESSED STEEL CAR COMPANY, INC.

LOS ANGELES 58, NEW YORK 7, ST. LOUIS 16, TULSA 3

Serving the Oil Industry

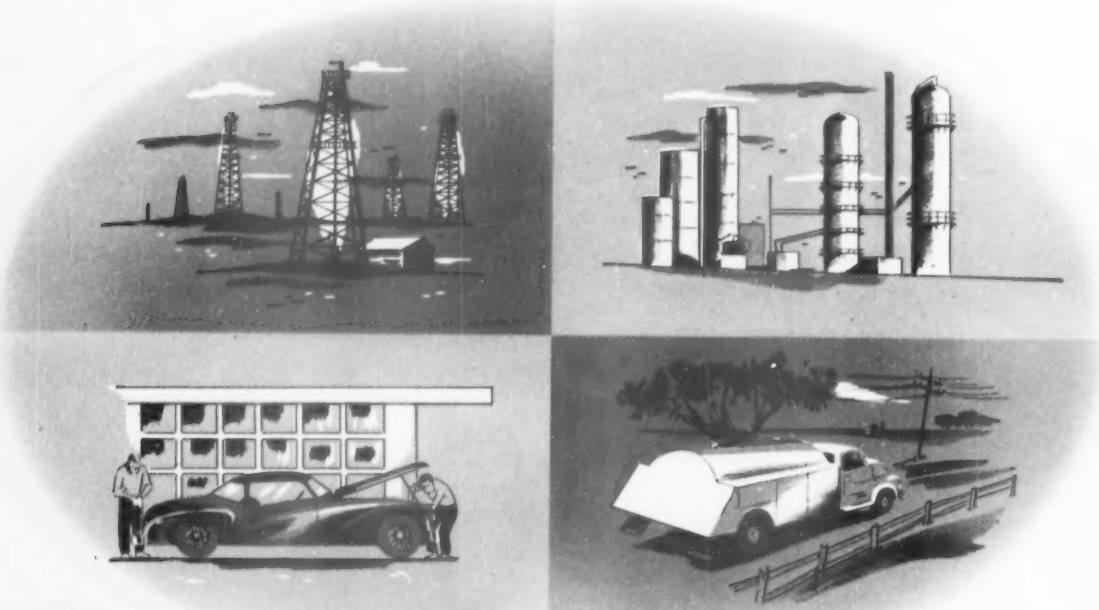
For more than a quarter of a century
oil men have relied on "The Oil Bank of America"
for all of their financial requirements.
Wherever your operations may be . . . in whatever
segment of the industry you, too, can benefit
through National Bank of Tulsa oil financing.

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

NATIONAL BANK OF TULSA

The Oil Bank of America

the bright coat that protects Petroleum Installations everywhere



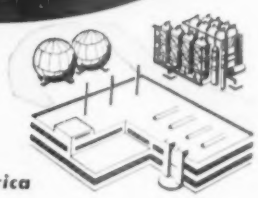
"Liquid Aluminum"

Liquid Aluminum will protect and brighten petroleum industry buildings and equipment from rig to retail. It protects against ruinous rust and also against corrosion from smoke and fumes. Its high reflectivity decreases evaporation losses. Its bright, sparkling appearance makes building interiors and exteriors more attractive . . . more sales-inviting. Put *Liquid Aluminum* to work for you and watch it cut maintenance and replacement costs!

Look for the *Liquid Aluminum* label on the aluminum paint you choose. It is made to approved minimum standards that have been adopted by the many paint manufacturers who make *Liquid Aluminum*. These standards assure you of the best combination of elasticity and durability for longest life on most painting applications. Ask your paint supplier or write for names of manufacturers to Reynolds Metals Company, 2595 South Third Street, Louisville 1, Kentucky.

ONE-COAT PROTECTION FOR YOUR BUILT-UP OR RUSTABLE METAL ROOFS

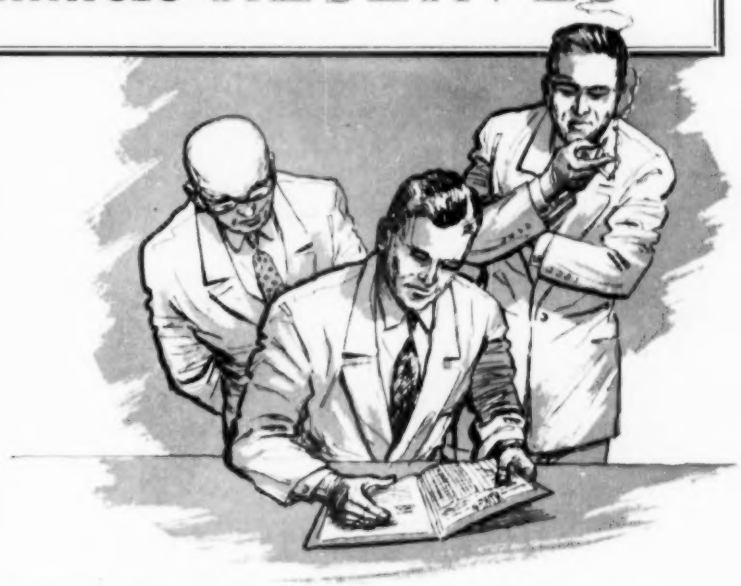
It's *Liquid Aluminum* Roof Paint or Coating with this label and this warranty. It will add years to roof life . . . and keep buildings cooler in summer to cut air conditioning costs and increase employee efficiency and morale. The *Liquid Aluminum* label and special Warranty Seal are your assurance of top quality. Write for folder.



This advertisement appears in the interest of the Paint Industry of America

IS THERE A DIFFERENCE IN CORE ANALYSES?

ASK AN INSTITUTION WHICH FINANCES RESERVES



At no stage during the productive life of an oil field does the quality of reservoir information become more pronounced than during financial negotiations for the purchase or production of reserves. With such data, *from a recognized source*, the points of economic reality are more quickly resolved. Without it, negotiations often disintegrate.

The development of reliable core analysis data goes far beyond the mere compilation of mechanically-procured information. Frequently, when the inconstant behavior of a particular reservoir contradicts the results of routine laboratory procedure, interpretation must be integrated with the logic of past experience and research in many other areas.

Core Lab data from 28 area facilities are accepted by financial organizations as accurate, comprehensive information based on *18 years' experience, 25,000 individual core analyses, and 700 different reservoir fluid analyses.*

To facilitate the future acceptance of reservoir data, make today's analysis Core Lab's.

CORE LABORATORIES, INC.

801 CORE STREET, DALLAS, TEXAS

DALLAS, HOUSTON, CORPUS CHRISTI, MIDLAND, ABILENE, SAN ANTONIO, TYLER TULSA, FT. WORTH, WICHITA FALLS, OKLAHOMA CITY, ARDMORE, GREAT BEND, NEW ORLEANS, SHREVEPORT, HATTIESBURG, JACKSON, LAFAYETTE, DENVER, BAKERSFIELD, WORLAND, STERLING, BILLINGS, CASPER, EL DORADO, LUBBOCK, FARMINGTON, LOVINGTON; CALGARY, EDMONTON, REGINA, CANADA; VENEZUELA, S. A.

CORE LAB

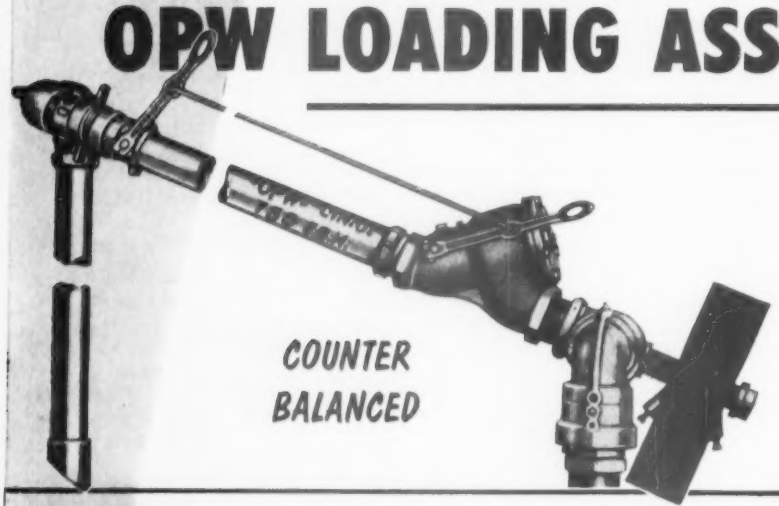
PETROLEUM RESERVOIR ENGINEERING

2 COMPLETE LINES for Faster, Safer, More Convenient Liquids Handling . . .

SPRING BALANCED

SPRING BALANCED • COUNTER BALANCED

OPW LOADING ASSEMBLIES



COUNTER BALANCED

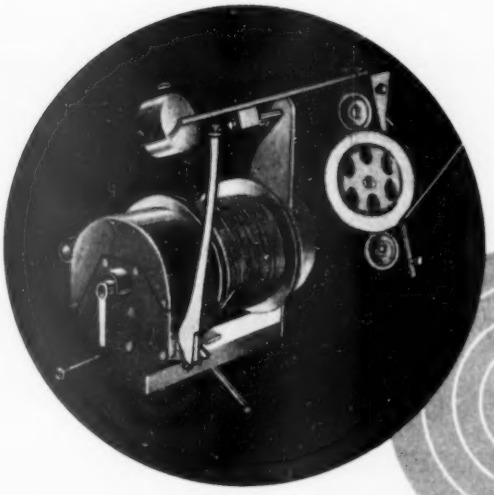
Oil and chemical companies alert to reducing tank car and truck loading and unloading time without jeopardizing safety standards and contaminating product are converting daily to the trouble-free operation of OPW LOADING ASSEMBLIES.

Behind this industry acceptance are several determining factors:

- **COMPACTNESS**
- **CONVENIENCE**
- **FAST DELIVERY**
- **SMOOTH OPERATION**
- **LONG SERVICE LIFE**
- **MINIMUM PRESSURE DROP**

CATALOG F-7 OG provides sizes, engineering data and specifications on all OPW Spring-Balanced and Counter-Balanced Loading Assemblies. Free on request.

OPW CORPORATION 2731 Colerain Ave., Cincinnati 25, Ohio



REAL
DEEP
DOWN
ACCURACY

HALLIBURTON
MEASURING DEVICES

Accurate measuring – regardless of depth or well conditions – is the unrivaled standard set by Halliburton Measuring Devices. On every job, Halliburton provides the important accuracy you need to prevent costly errors or delays. And only Halliburton can meet the specific requirements of your well with a complete line of Measuring Devices and special features.

Pinpoint accuracy replaces guesswork when you use such Halliburton features as direct reading of depth from the Veeder Counter and a mud-free line cleaned by a special wiper. Select a standard, heavy duty or extra heavy duty Measuring Device and you have exactly the right equipment for your job. There's also a wide selection of mountings, measuring lines and power sources – including hand or cat head operation and gasoline or diesel power – adding to the versatility of this rugged Halliburton equipment.

Halliburton Measuring Devices are designed to operate at time-saving speeds – ranging from 100 to 1100 feet per minute. Without loss of time, you are sure of more accurate data – important for cutting costs.

Developed during more than twenty-five years of research, testing and experience, your Halliburton Measuring Device is engineered for a long life of dependable service. And, after purchase, your equipment is backed by experienced service personnel – available anytime, anywhere.

Use a Halliburton Measuring Device exactly suited for your job and be sure of greater economy. Real accuracy – regardless of depth – is within reach of every operator. Just call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

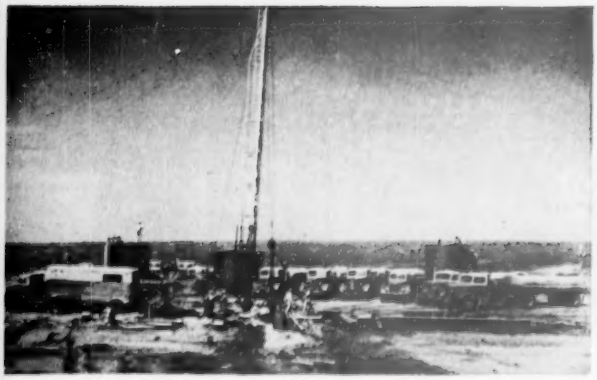
CEMENTING EQUIPMENT

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING!

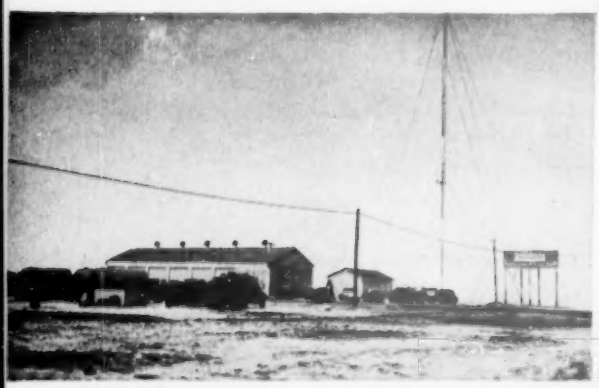
HALLIBURTON

Provides nation's largest efficiency by using

GE 2-WAY RADIO



● The equipment and personnel for a large acidizing treatment of Kansas well is dispatched and aided by General Electric two-way radio at HOWCO's Great Bend office.



● 300' tower and powerful G-E base station at HOWCO's Tioga, North Dakota camp keeps in touch with field units operating in below zero weather near the Canadian border.

● Duncan dispatcher, J. W. McClanahan, receives call from well site 43 miles away via G-E two-way radio. Instant communication with all field operations enables Halliburton to schedule equipment and expedite service throughout the oil field.

● The latest addition to Halliburton's fleet, the world's first ocean-going cementing ship, heads out for water job near the mouth of the Mississippi River. This ship is completely equipped with the latest equipment, including G-E two-way radio to provide instant communication with dispatcher at Harvey, Louisiana.

"YEARS AHEAD WITH G-E RADIO!"

oil field service . . . earns reputation for unparalleled G-E 2-way facilities!

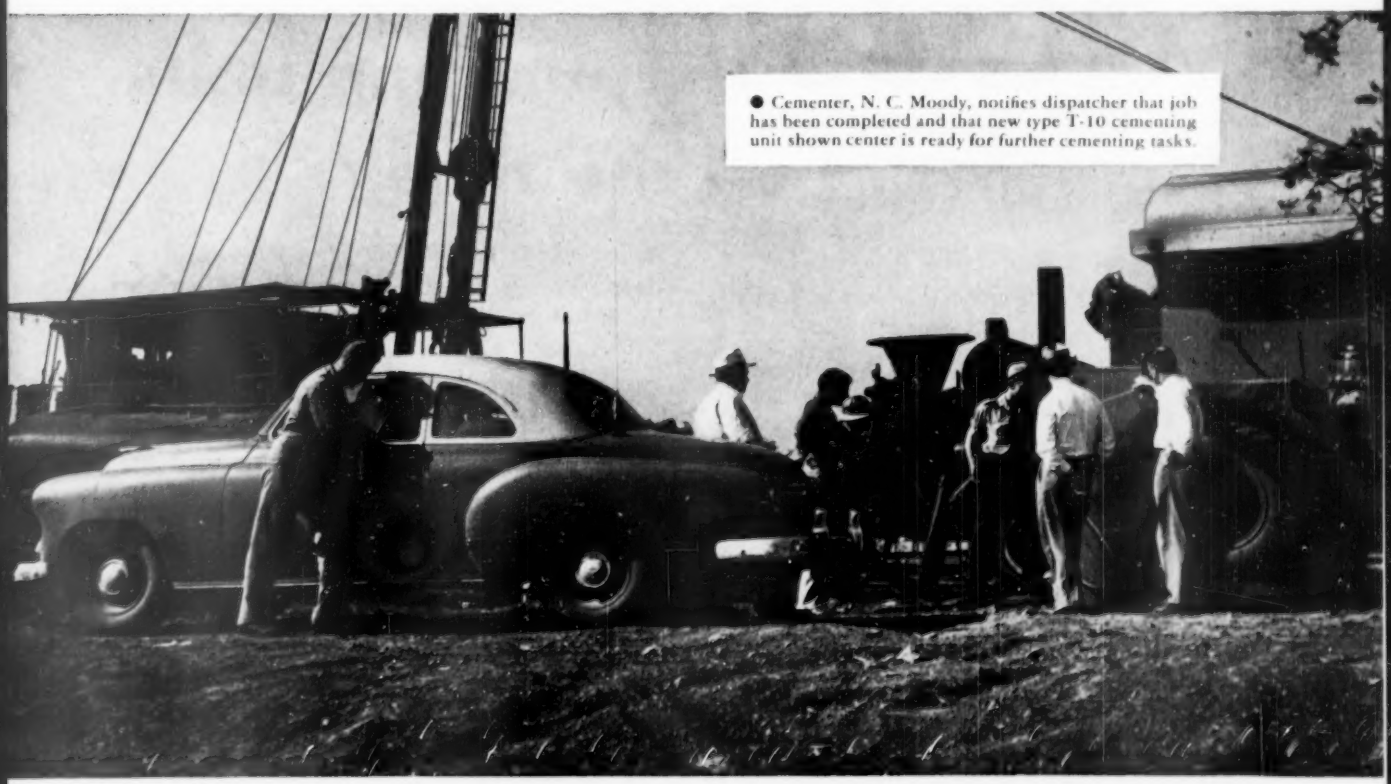
IN ADDITION to its reputation as the leading oil field service organization, HOWCO has long been famous for its constant efforts to develop tools and methods to further improve service in the petroleum industry. As part of this program, HOWCO has installed one of the world's largest privately owned two-way radio communications systems.

Over 700 General Electric 2-way mobile radio units and 70 base stations are used to coordinate activities and insure prompt service to its customers.

Halliburton officials credit G-E communications not only for always reliable performance but as an important tool for getting every job done efficiently . . . promptly —whether it be in the snows of North Dakota, the sandy plains of New Mexico, or the swamps of Louisiana!

Remember, when radio will solve one or a hundred problems for you . . . General Electric will do it best! Call the CAS* man at a local G-E office today or write for information. *General Electric Company, Section X824-15, Electronics Park, Syracuse, New York.*

*Communications Advisory Service



● Cementer, N. C. Moody, notifies dispatcher that job has been completed and that new type T-10 cementing unit shown center is ready for further cementing tasks.

You can put your confidence in—

GENERAL ELECTRIC

CABOT pumping units get better all the time!

Ask the J&L men you know what you could reasonably expect to gain from Cabot units.

A RUBBER BEARING joins the walking beam and pitman — torsional deflection instead of friction. Nothing to lubricate. Wonderful shock absorber. Patented.

CRANK BALANCE that one man can adjust without a truck and a crew.

REDUCTION employs Sykes-cut herringbone gears, flood lubricated. No oil seals used or needed on reducer shafts. Timken and Hyatt roller bearings.

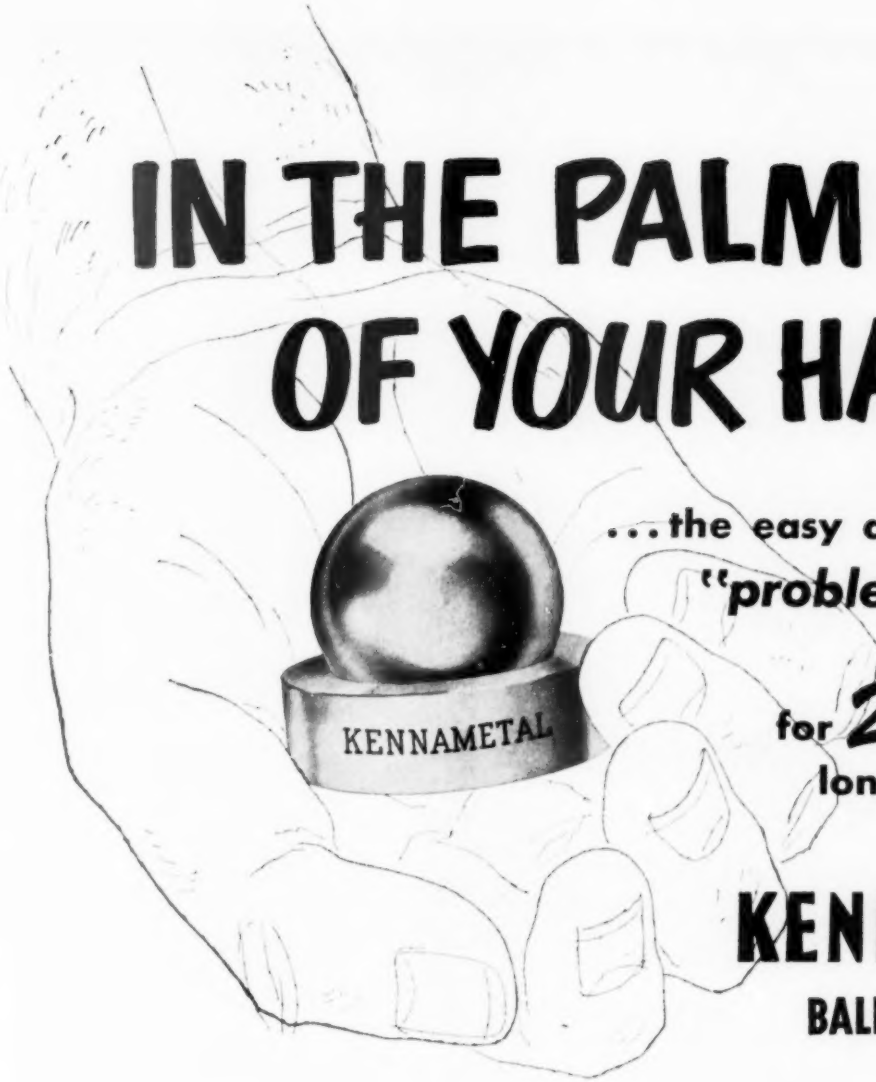
It has always been possible to lift a barrel of oil for less money with a simple, sensible Cabot.

JONES & LAUGHLIN STEEL CORPORATION
SUPPLY DIVISION

Serving The United States and Canada
General Offices: TULSA, OKLAHOMA
J&L Tubular Products and Wire Rope

PESA
PARTNERS IN PETROLEUM PROGRESS

IN THE PALM OF YOUR HAND!



...the easy answer to "problem" pumping—

for 2 to 5 times longer service use

KENNAMETAL*

BALLS and SEATS

Small items, but *big factors* in reducing the risk of bottom hole valving failures, Kennametal Balls and Seats possess diamond-like hardness that assures more constant valving efficiency. They have unmatched resistance to abrasion and corrosion . . . last up to 5 times longer than "special" alloys in "problem" wells where flour sand cut fluids, hydrogen sulfides, and other corrosive agents are present. Round trips are less frequent . . . production volume increases.

Kennametal API Balls and Seats are available at leading supply stores, or from your pump manufacturer. Balls are furnished either regular, or lightweight (used where ball flutter, cage wear, or fluid pounding are present). Seats can be had either flat or with Monel rib.

*Registered Trade-Mark

KENNAMETAL

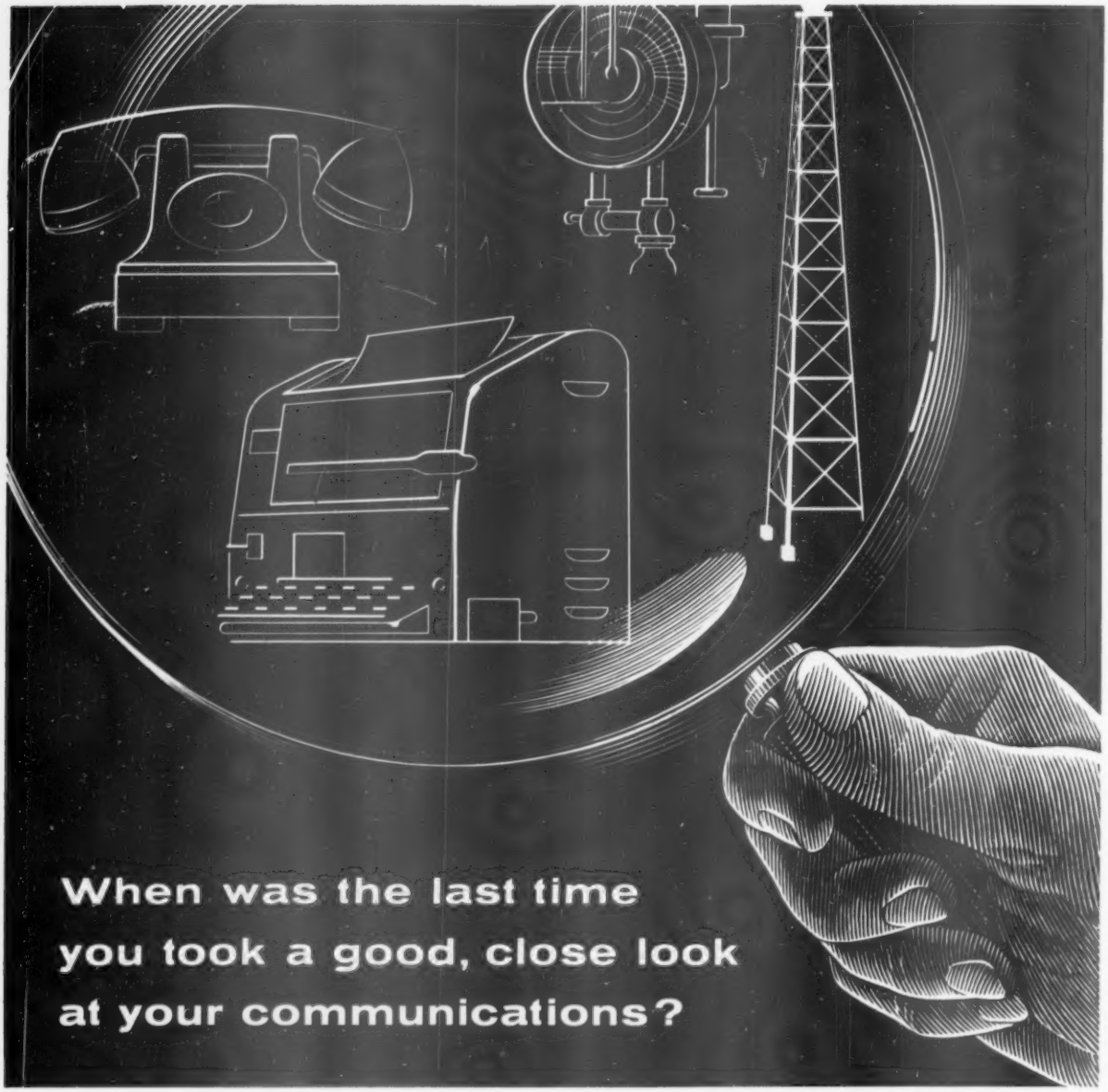
REDUCES THE RISK OF SUB-SURFACE VALVE FAILURE

Quality Sintered Carbide API Balls and Seats

Manufactured by

Kennametal Inc., Latrobe, Pa.

SOLD BY MAJOR PUMP MANUFACTURERS



To keep in step with your constantly changing business, your communication system should be examined periodically. In that way, your communications never become outdated — always meet your exact needs at the lowest cost. If you have Bell System service, such studies are a continuing activity.

Bell System communication engineers will also help you take a good, close look at your own communications . . . *at no cost to you!* Their detailed study will help you get the most efficient use of your facilities . . . whether they are long distance, mobile, teletypewriter, or metering and supervisory control.

A growing number of pipelines are taking advantage of Bell System service in meeting the communications demands of modern operation.

• • •

If you are interested in a detailed communication survey by Bell System engineers without charge, call your local Bell Telephone representative now.

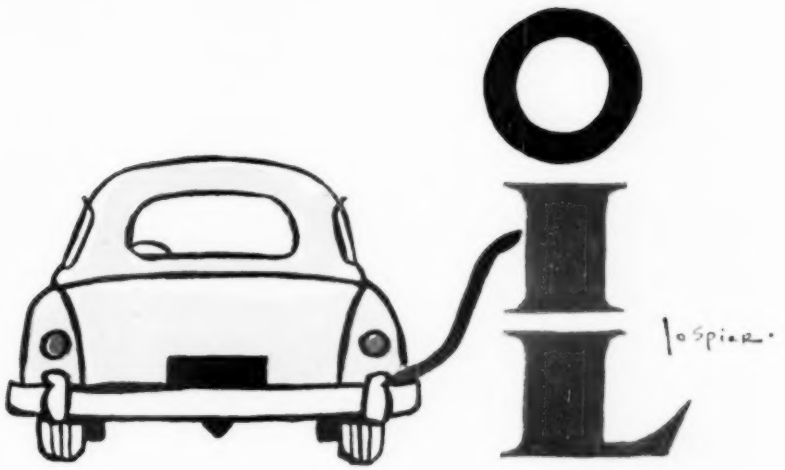
PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE

METERING CHANNELS

BELL TELEPHONE SYSTEM



OIL MEANS MILES

The family car . . .

the modern bus . . . the

diesel train . . . depend on oil

to speed them along mile after mile.

Speed in the oil fields saves valuable rig

time . . . the simultaneous recording of all

curves permits Schlumberger to immedi-

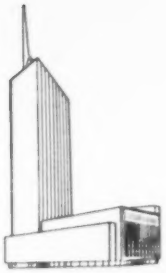
ately deliver complete electrical log

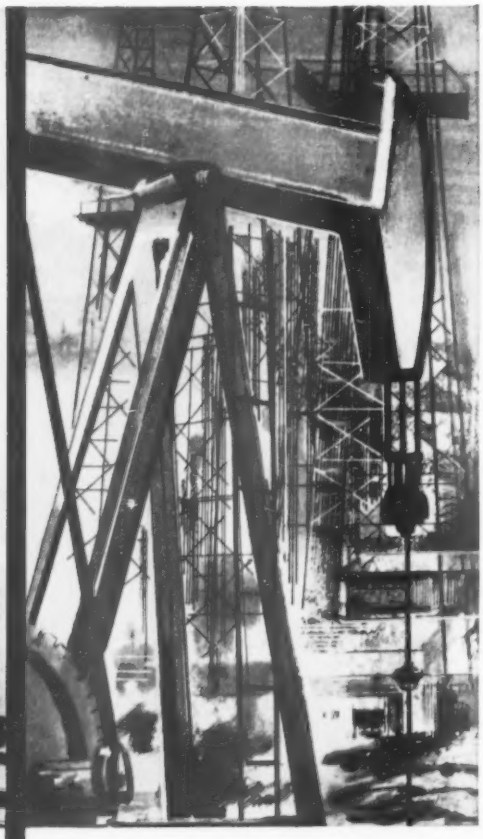
prints in the field.

. . . and Schlumberger means Service

Schlumberger Well Surveying Corp. • Houston, Texas

What does it take to build an "Oil Bank"?





CONSTRUCTION

It takes facilities—a lot of them—to serve the financial needs of oil production. Look at the Dallas skyline and you'll see them — 40 stories, including 4 basement levels . . . big enough and broad enough to serve Texas' biggest industry.

PRODUCTION

Oil production — 4,171,700 barrels of it every day — is the cornerstone of Southwestern prosperity. It takes money to keep it humming. Supplying that money is what it takes to make an "Oil Bank."

This is your Republic

REPUBLIC
NATIONAL BANK of Dallas

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

CAPITAL AND SURPLUS $50,000,000

★

LARGEST IN THE SOUTH

Petroleum Industry's Operating Equipment Demands The Best Filter Protection

Marvel Synclinal Filters are installed on this drilling rig by the manufacturer, Emsco Derrick and Equipment Company. Marvel Synclinal Filters keep the lubrication system free from foreign matter. Insert circle shows line model installation.
(Photo Courtesy of Emsco Derrick and Equipment Company)

MARVEL SYNCLINAL FILTERS INSURE THIS PROTECTION

That is why over 400 Original Equipment Manufacturers, like Emsco, install Marvel Synclinal Filters as original equipment; thus assuring their machines longer life, operating with all the productive efficiency built into them.

Marvel Synclinal Filters offer the greatest amount of ACTIVE filtering area within the smallest amount of space, allow longer periods of operation between cleaning and are so simply designed that any workman can quickly disassemble, clean and reassemble on the spot. Line types operate in any position and may be serviced without disturbing pipe connections.

A SIZE FOR EVERY NEED

Available for sump or line installation in capacities from 5 to 100 G.P.M. and choice of monel mesh sizes ranging from coarse 30 to very fine 200.

IMMEDIATE DELIVERY!

Marvel not only delivers a top grade filter in both quality and performance, but delivers IMMEDIATELY. If desired, shipments are made same day orders are received.

TEST AND INSPECT — BEFORE YOU BUY!

To qualified engineers and operators in oil companies and contracting firms we will send a MARVEL SYNCLINAL FILTER to test and inspect before purchase. Please advise type, (Sump or Line) G.P.M. and mesh size you desire for this purpose.

WATER FILTERS In response to the great demand we have adapted both our sump and line types for use in all water filtering applications. No changes have been made in the basic synclinal design.

LINE TYPE
(Cutaway)

For installation on Crank Case, Lube Oil Filtration, Pump Line Pumping Engines, Gas Compressors, Reciprocating Compressors (single or combination), Engines—Well Pumping or Drilling, and Hydraulic Powered Construction Equipment.

SUMP TYPE
(Cutaway)

For installation on Hydraulic Systems in GEOPHYSICAL DRILLING RIGS, Shot Hole, Core, Slim Hole, Work Over, etc., Oil Well Drilling Rigs, Pipe Line Valves, Machine Tools, Pumping Units, Field Processing Valves and all Hydraulically Operated Construction Equipment.

MARVEL *Engineering Company*

625 WEST JACKSON BLVD., CHICAGO 6, ILLINOIS

Phone: Franklin 2-4431

Marvel Engineering Company OG-3
625 W. Jackson Blvd.
Chicago 6, Illinois

Without obligation, please send me complete data on Marvel Synclinal Filters as follows:

Catalog No. 106 for Oil Filters
Catalog No. 900 for Water Filters

Name .....
Company .....
Address .....
City ..... State .....

SMOOTHNESS in a rig means fast, trouble-free operation.

- Drum, large diameter, extra long.
- AIR-O-MATIC friction transmission and drum clutches
- Easy operating, finger tip controls.
- Built in Hydromatic brake with friction engaging clutch.
- Direct mechanical, fluid coupling or torque converter drive, optional.
- Six rotating and hoisting speeds.

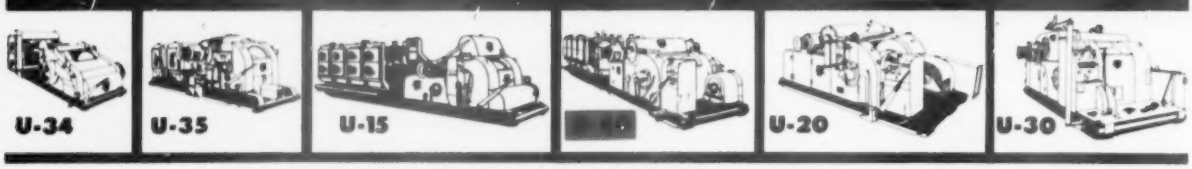
These features make UNIT RIG'S Model U-40 a SMOOTH, fast operating, trouble free rig. The U-40 is designed to drill economically from 6,000 to 10,000 feet and is highly portable.

Buy a SMOOTH rig.
Buy a UNIT U-40.

U-40

UNIT RIG & EQUIPMENT CO.
TULSA, OKLAHOMA U.S.A.

DESIGNED FOR THE JOB....



UNIT RIG DRAW WORKS ARE SOLD THROUGH THESE DISTRIBUTORS IN THE U.S.A. AND CANADA

MID-CONTINENT SUPPLY COMPANY
IVERSON SUPPLY COMPANY
BOVAIRD SUPPLY COMPANY
HOWARD SUPPLY COMPANY
LUCEY PRODUCTS CORPORATION
HOUSTON OIL FIELD MATERIAL COMPANY
NORVELL-WILDER SUPPLY COMPANY
AND OTHER LEADING SUPPLY STORES

EXPORT SALES — MID-CONTINENT SUPPLY COMPANY, 42 Broadway, New York City. Cable — MIDUNITRIG

Freezing outside...130°F. inside

Polyken

PROTECTIVE TAPE COATING

BEATS CORROSION

ON GAS TRANSMISSION LINE

The polyethylene protection of Polyken outlasts previous method 3 to 1—with no sign of wear—for Michigan-Wisconsin Pipe Line Company

Compressor Station No. 10 is a key operation of Michigan-Wisconsin Pipe Line Company.

At the cooling tower, with water reaching average temperatures of 130° F., the corrosion problem was serious. Protective paints lasted only three to four months as water used to cool gas in the line sprayed down over pipes.

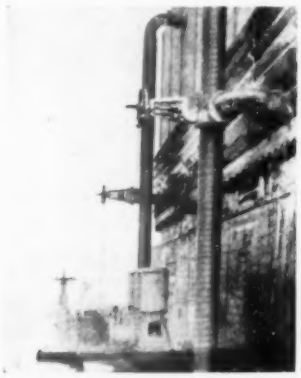
The answer was *Polyken* Protective Tape Coating No. 910. Now in use for nine months, this polyethylene protection has outlasted previous methods 3 to 1, with no sign of wear, and here's why:

- *Pre-formed plastic film coating* . . . controlled process from reproducible raw materials assures uniform coatings every time.
- *Polyethylene* coating . . . 8 mils of tough, oriented, plastic film, recognized for its excellent resistance against corrosive attack and moisture, and its high dielectric strength.
- *Bonded* securely by a 4 mil stable adhesive (pre-applied to the film), a durable protective barrier in itself.

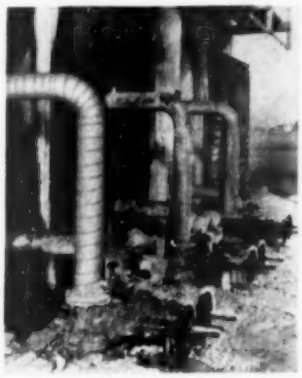
Less work to apply, too. Use it right off the roll. No heat, liquids, solvents or thinners. No drying time, clean-up time, or shut-down time. Goes on tightly and evenly with a superior bond both to the pipe and to itself on the overlap.

Polyken Protective Tape Coatings are available in two colors: black, No. 900, and gray, No. 910. Mail the coupon below for free test samples.

Cold weather . . . hot pipe . . . and still the job is easy! *Polyken* protective tape coating goes on fast and smooth, bonds tight to the pipe and to itself on the overlap with its special adhesive.



In service nine months with no sign of wear—and two men wrapped these 35-foot 12-inch pipes in less than four hours.



See the difference between the pipe at left protected with *Polyken* tape and rust and corrosion on pipes at right.

Polyken, Dept. OG-C
222 West Adams St., Chicago 6, Illinois

Please send me samples and further information on *POLYKEN* PROTECTIVE TAPE COATINGS.

Name_____ Title_____

Company_____

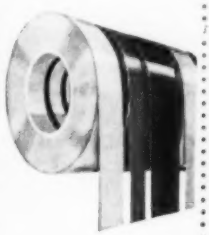
Street Address_____

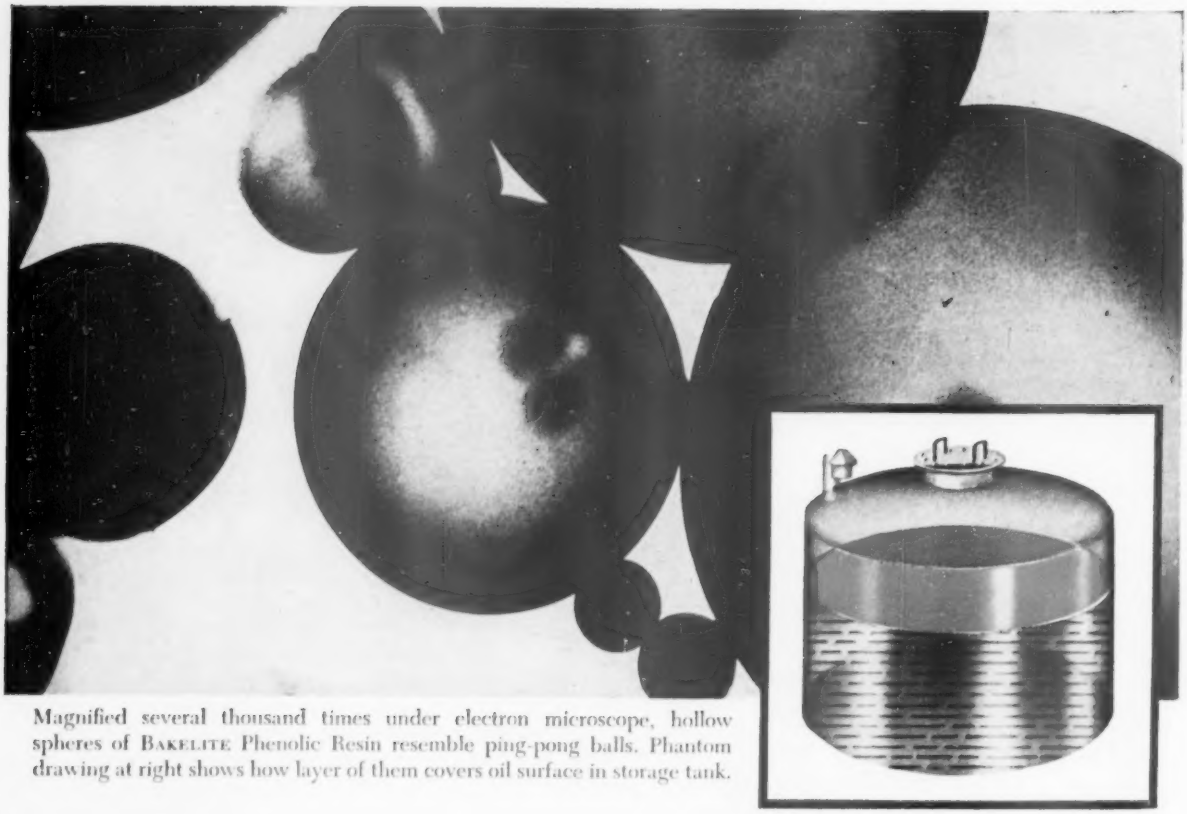
City_____ Zone____ State_____

Polyken®

PROTECTIVE COATINGS

POLYKEN PRODUCTS DEPARTMENT OF THE KENDALL COMPANY





Magnified several thousand times under electron microscope, hollow spheres of BAKELITE Phenolic Resin resemble ping-pong balls. Phantom drawing at right shows how layer of them covers oil surface in storage tank.

What can MICROBALLOON* spheres do for your Evaporation Problems?

What are they? Illustrated are tiny, hollow spheres of BAKELITE Phenolic Resin filled with inert nitrogen gas. Their diameters average only .0002 to .0036 of an inch. A cubic foot weighs about 8.7 pounds. They have the appearance of finely ground, reddish-brown flour.

What can they do? An inch-thick layer of these spheres, floating on the surface of crude oil in storage tanks, can cut evaporation losses *80 to 90 per cent*. With an 88-foot-diameter tank, this means 2.34 barrels saved every day—over 850 barrels a year.

How are they used? Mixed with crude oil, then pumped into a tank, they float to the surface, forming a blanket that rises and falls with the oil level. This covering flows around internal tank supports, keeping the surface sealed as the level changes. Because BAKELITE Phenolic Resin resists oil, the spheres do not fill and sink. For more than two years, these spheres have floated on crude oil in testing laboratories without measurable deterioration. Their wall strength and resistance to abrasion keep them from bursting as they jostle together and against tank sides. Their small size and non-abrading qualities prevent damage to precision pumps and pipe lines.

Get them from Bakelite Company. For information about these hollow spheres of BAKELITE Phenolic Resins, write Dept. TC-64.

*MICROBALLOON is a trade-mark of the Standard Oil Company (Ohio).

BAKELITE
TRADE-MARK
PHENOLIC RESINS

TRADE MARK
BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.
In Canada: Bakelite Company
Division of Union Carbide Canada Limited
Belleville, Ontario

...make a *Big Difference!*

BE SURE YOU ALWAYS GET GENUINE O·C·T FLOW BEANS

Most flow beans look a lot alike at a glance. The difference is more than "skin deep." O-C-T Flow Beans, for example, are made of special analysis steel. Threads are accurately machined to API specifications. Orifices are precision drilled to assure uniformity in flow. O-C-T Flow Beans are held strictly to proration test specifications. The only way you can be sure that you get this uniformly high O-C-T quality is to always look for the O-C-T trademark when you buy. It is clearly stamped on the bean body. Specify O-C-T to your supply store. They are available through more than 700 supply store locations.

7 OUT OF 10 OPERATORS SELECT O-C-T FITTINGS

Oil Center Tool Co.
P. O. Box 3091 Houston, Texas

Export Representatives Sterling Arms Le Grand Sutcliff & Gell Ltd. Rochester Kent England Address Export Inquiries for All Other Countries to P. O. Box 3091 Houston 1, Texas

Crude oil pipe line from Yale, Okla., to Borger, Tex. This is 10¾" Electric Weld Line Pipe.

Here's line pipe that goes in **fast** in the field

Field welding joints before ditching Electric Fusion Weld Gas Line from Petersburg, Ohio, to Cleveland, Ohio. Three 60-foot joints were field welded together before coupling.

Take that Electric Resistance Weld Line shown above. Or a big 30" Electric Fusion Weld Line, shown at the right. When they're made by Republic, they have one thing in common:

They go in fast—And it's no accident. Circumference is always constant. That means field joints line up accurately and quickly. The entire circumference can be welded at top speed. Plus the fact that uniform wall thickness provides an even distribution of metal all around the pipe.

You can make smooth, uniform bends in the field. Why? High ductility. And because of uniform high yield strength, with Republic Line Pipe you can build high pressure lines. And uniform wall thickness means dependability in every inch of the line.

So when you need line pipe for oil and gas transmission, high or low pressure, remember, Republic makes both types—Electric Resistance Weld and Electric Fusion Weld. Also, Continuous Butt Weld Pipe for gathering lines. Write for more facts.

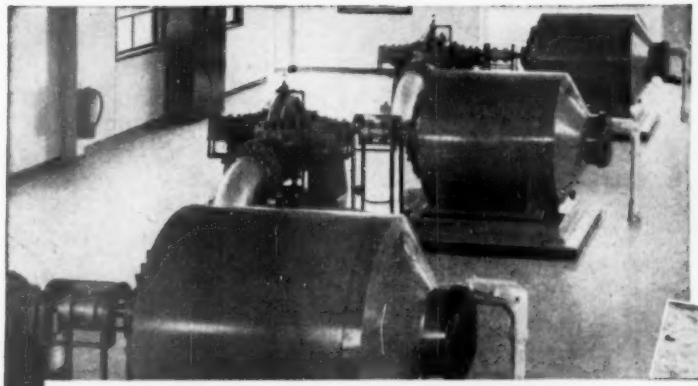
REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

REPUBLIC STEEL

REPUBLIC LINE PIPE

ELECTRIC RESISTANCE WELD • ELECTRIC FUSION WELD
CONTINUOUS BUTT WELD

Other Republic Products include Casing and Tubing — Steel and Plastic Pipe — Studs, Bolts and Nuts — Heat Exchanger Tubes — Steel Buildings



INDOORS or OUT

DIRT and CORROSION

Can't Hurt These Motors

Here is an explosion-proof type of motor that will solve many of your dirt and corrosion problems. Install anywhere, indoors or out.

Cooling System is Self-cleaning

Cooling air is carried through the heat-exchanger tubes with sufficient velocity to expel practically any kind of dirt. If oily or sticky dirt should cling, tubes can be ramrodded clean in a few minutes because tubes are straight and tube ends are exposed.

Choice of Corrosion-resistant Materials

You can lick corrosion with this motor, too. Tubes are available in a variety of materials to meet practically any corrosive atmospheric condition. Allis-Chalmers tube-type motors have long and successful experience in such difficult applications as caustic plants, refineries and petrochemical plants, power plants with fly ash problems and many others.

Next time you need a motor for a dirty or corrosive location or for outdoor operation in all kinds of weather, call your Allis-Chalmers District Office. Get complete information on Allis-Chalmers tube-type totally-enclosed, fan-cooled and explosion-proof motors. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B7149. Available in ratings on frames larger than NEMA 505 up to 3000 hp. (Not all UL approved) A-4223

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

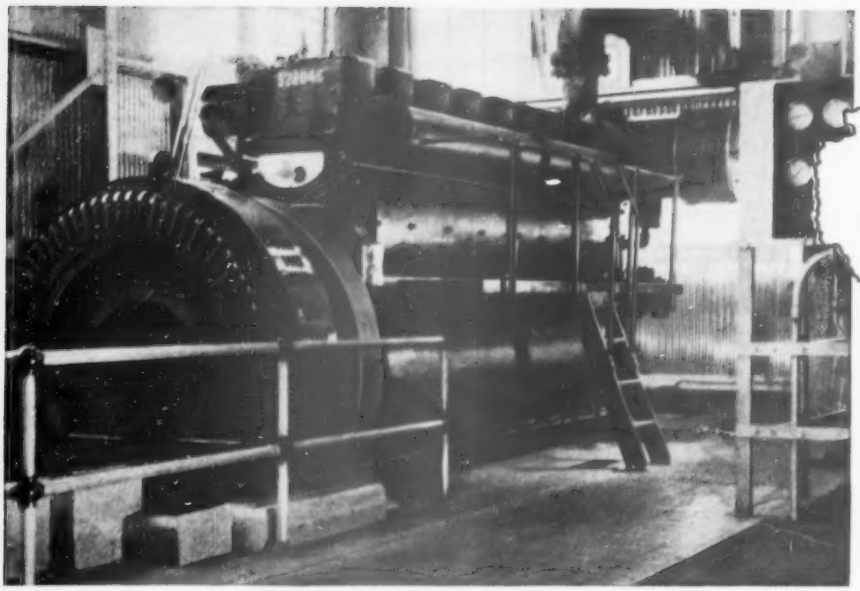
by Allis-Chalmers Authorized Distributers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS



this eight-cylinder, 1080-hp Alco Diesel Engine delivers dependable, round-the-clock power to a large bauxite mining center and its community.

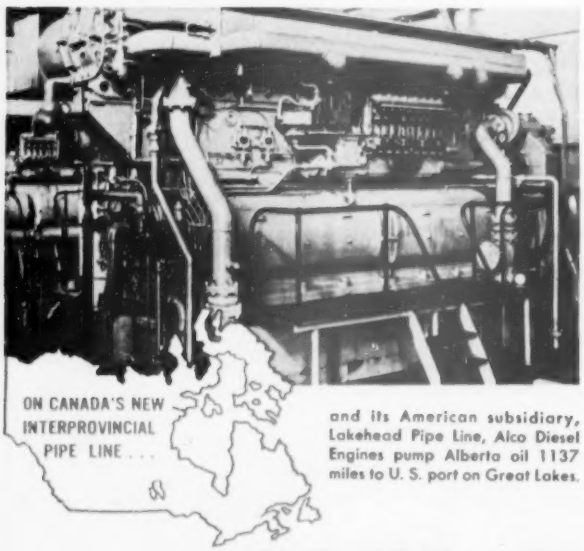
THE STORY GETS AROUND

Make a better product and the story gets around.

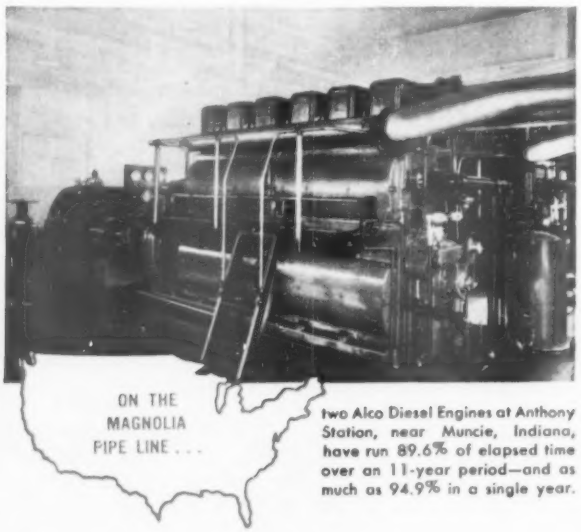
The story of Alco Diesel Engines, for example, has traveled around the entire world—right along with the engines themselves. High points in the story are:

- ☆ **COMPACT DESIGN—saves floor space, cuts construction costs.**
- ☆ **HIGH ENGINE EFFICIENCY—for lower fuel costs.**
- ☆ **FLEXIBLE POWER RANGE—for lower expansion costs.**
- ☆ **MEDIUM SPEED—for lower auxiliary equipment costs.**
- ☆ **HANDLES ANY TYPE OF JOB—continuous or standby, temporary or permanent.**

Your nearest Alco sales representative will be happy to give you complete details. (For information on the new, heavy-duty lightweight Model 251A, ask for Bulletin DE-2.) Sales offices in New York, Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady and St. Louis.



and its American subsidiary, Lakehead Pipe Line, Alco Diesel Engines pump Alberta oil 1137 miles to U. S. port on Great Lakes.



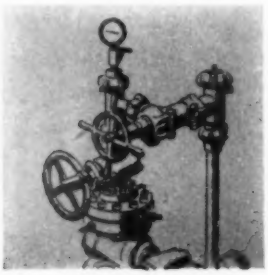
two Alco Diesel Engines at Anthony Station, near Muncie, Indiana, have run 89.6% of elapsed time over an 11-year period—and as much as 94.9% in a single year.

ALCO DIESELS

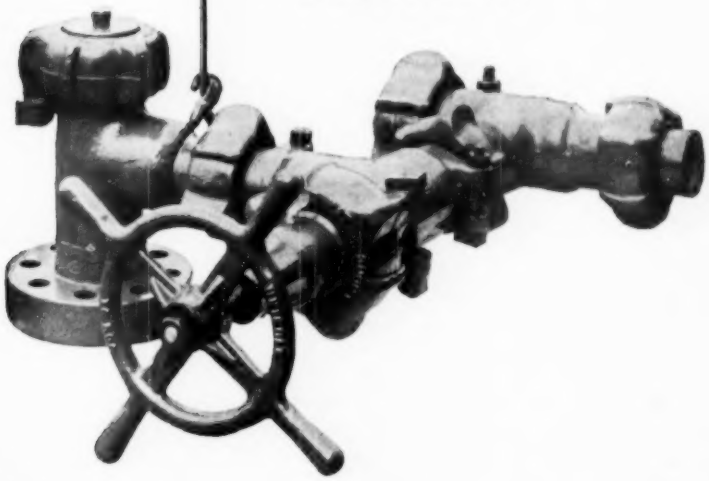
AMERICAN LOCOMOTIVE COMPANY

SCHENECTADY, N. Y.

UNIBOLT FLOW MANIFOLDS



started a new trend — the fabrication of salvageable parts into a compact, strong, lightweight unit that provides everything necessary above the master valve



More and more operators are requesting their Christmas tree supplier to furnish UNIBOLT Flow Manifolds because they are lighter in weight, stronger, and more economical, and easier to maintain than ordinary flanged Christmas tree wings.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more steel in shear, actually results in a higher factor of safety for the manifold.

The units of the manifold — UNIBOLT Tee or Cross, Adjustable Wing Valve, and Positive Choke Body — are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs. They are furnished in regular forged steel or in stainless steel for corrosive wells — 6,000, 10,000 and 15,000 lbs. test. The manifold is completely salvageable.

THORNHILL CRAVER CO.

P. O. BOX 1184 HOUSTON, TEXAS

The Right Move...

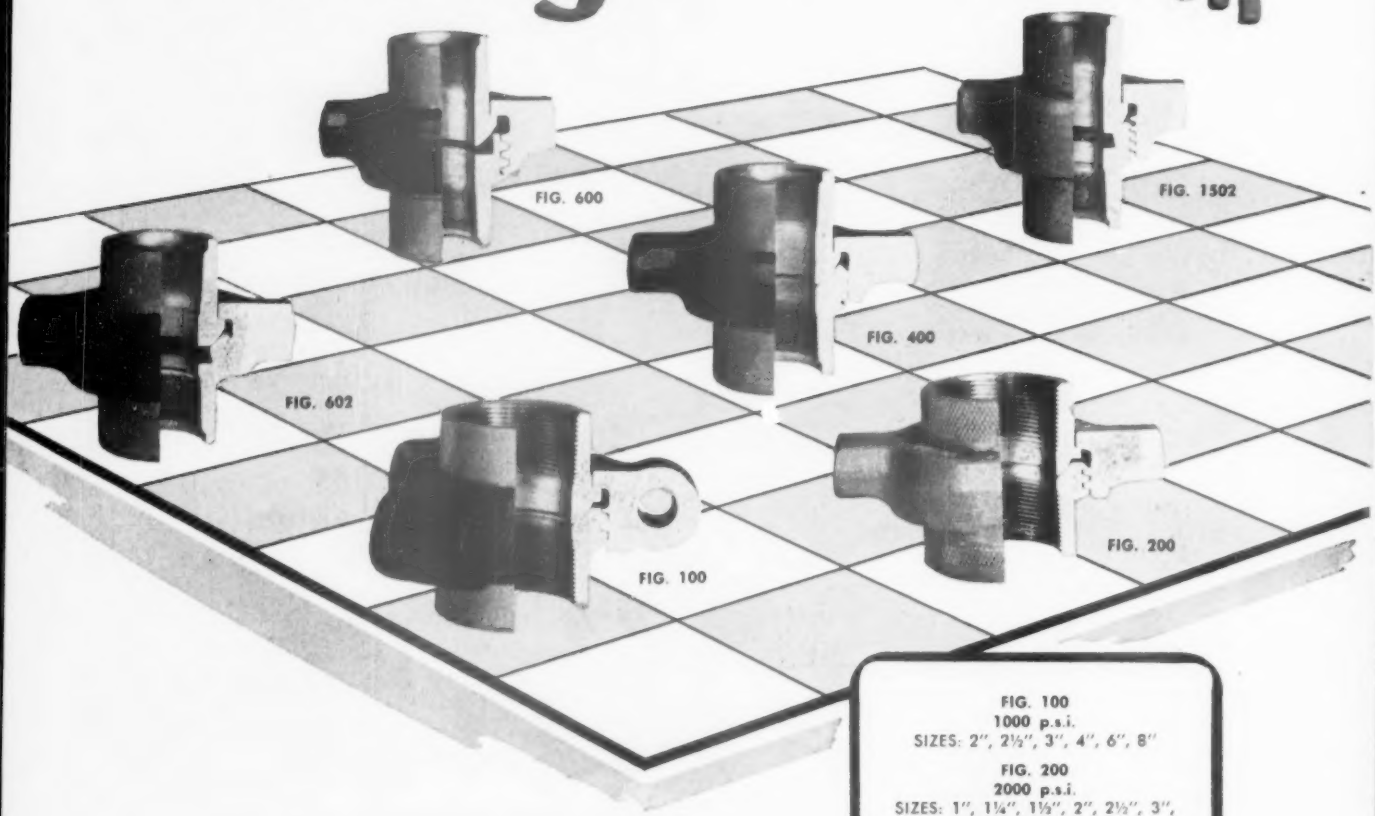


FIG. 100
1000 p.s.i.
SIZES: 2", 2½", 3", 4", 6", 8"

FIG. 200
2000 p.s.i.
SIZES: 1", 1¼", 1½", 2", 2½", 3", 4", 6", 8"

FIG. 400
4000 p.s.i.
SIZES: 2", 2½", 3", 4", 5½" O.D., 6", 7" O.D., 8", 10"

FIG. 600
6000 p.s.i.
SIZES: 1", 1½", 2", 2½", 3", 4"

FIG. 602
6000 p.s.i.
SIZES: 1", 1¼", 1½", 2", 2½", 3", 4"

FIG. 1502
15,000 p.s.i.
SIZES: 2", 2½", 3"

WECO UNIONS are *ALWAYS Right!*

You just can't make a wrong move when you standardize with WECO because there's a Union that is exactly right for every oil industry service from the drilling rig to the transport truck.

The famous ball and cone seat assures a positive seal. The strong durable construction assures long life and economy. They make up and break out repeatedly without damage to seats or threads.

Selected raw materials, advanced manufacturing practices, rugged Acme threads, heavier wall sections and precision seating surfaces mean you can trust WECO Unions for sealing and service.

PESA

it's **wise to standardize with...** WECO

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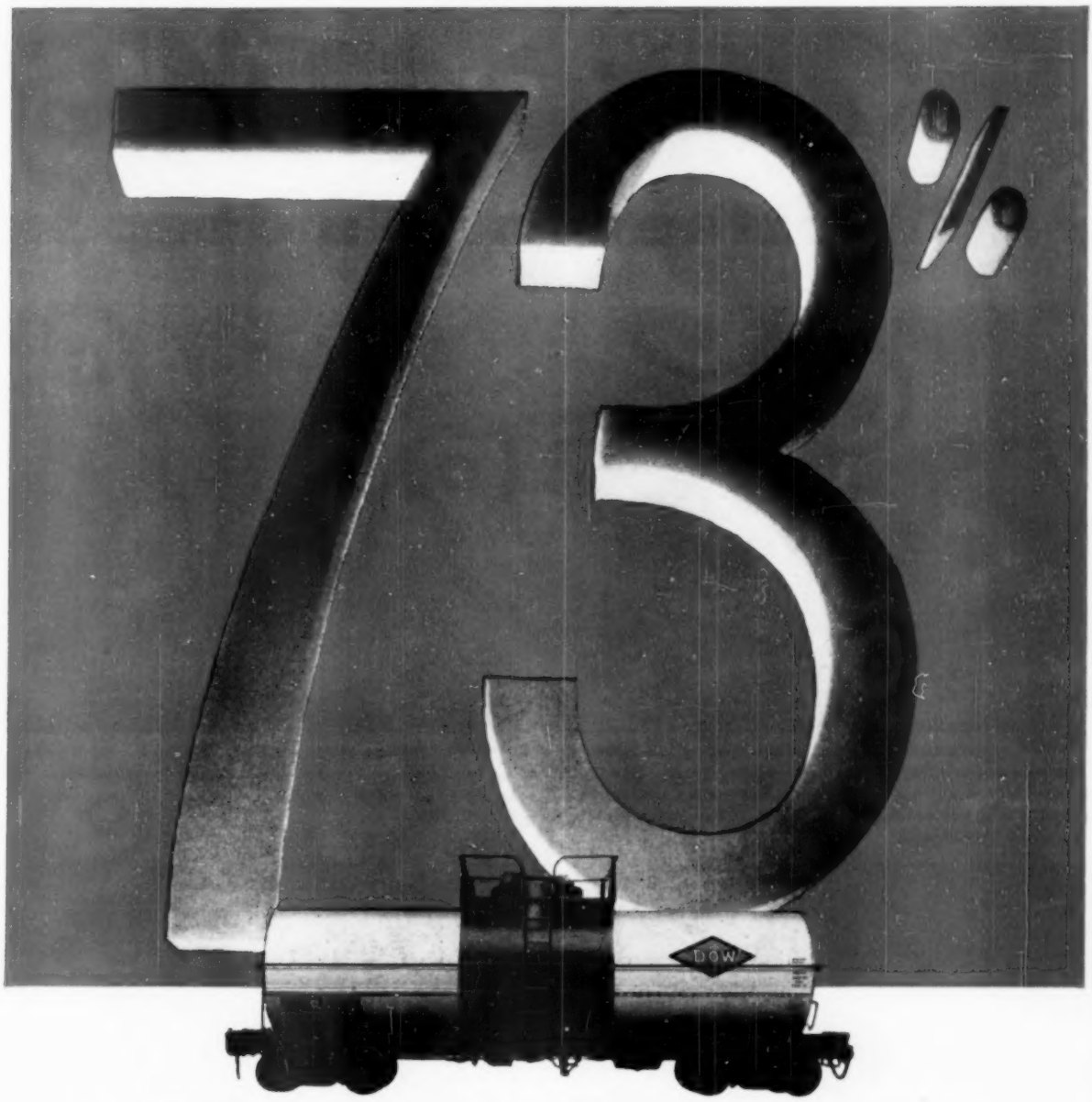
DOW

73%



DOW CAUSTIC SODA

If you haven't figured your caustic costs recently, you may be pleasantly surprised at the economy 73% can bring. Increasing freight rates are erasing the savings in 50% caustic solution for more and more users every day—they're probably doing the same for you.

If you'd like help in figuring the most economical caustic for your plant, our Alkali Sales Department will gladly lend a hand. THE DOW CHEMICAL COMPANY, Midland, Mich., AL 900C.

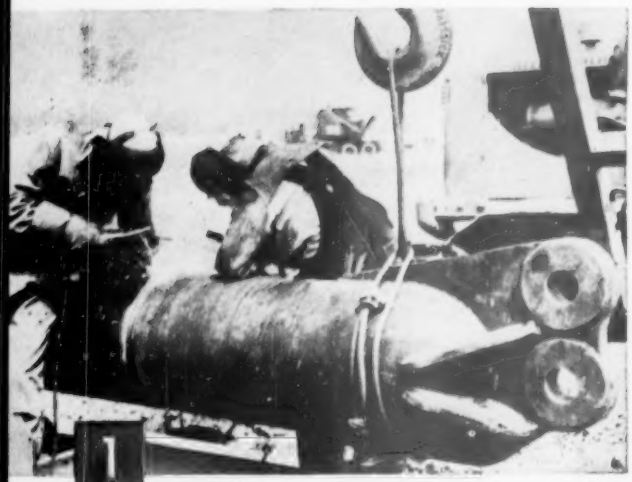
you can depend on DOW CHEMICALS

DOW

The remarkable story of

"OPERATION

the world's deepest



"OLD BULLHEAD," the watertight pulling dome, being welded to the first length of pipe. The 4-mile pipeline was pulled across the Straits by a powerful winch which was set in a concrete foundation approximately 2,700 feet from the water's edge on the Mackinaw City side.

A SECTION of the extra-heavy $1\frac{13}{16}$-inch wall National Seamless Pipe being prepared for welding. The pipe is resting on one of the Collins rubber-tired launchways.

THE FIRST SECTION of pipe ready for launching at St. Ignace, Michigan. On the water, in the background, is a dredge which assisted in the pulling operation. At the left is the Control Tower, nerve center of all operations during the "Big Pull."

MAKING A TIE-IN WELD between two of the 2500-foot sections of National Seamless. As each section was launched, a new section was welded to it, until all eight 2500-foot sections had been welded into one continuous 20,000-foot line of National Pipe.

WALLS WITHOUT WELDS

BIG PULL"

submarine pipeline crossing

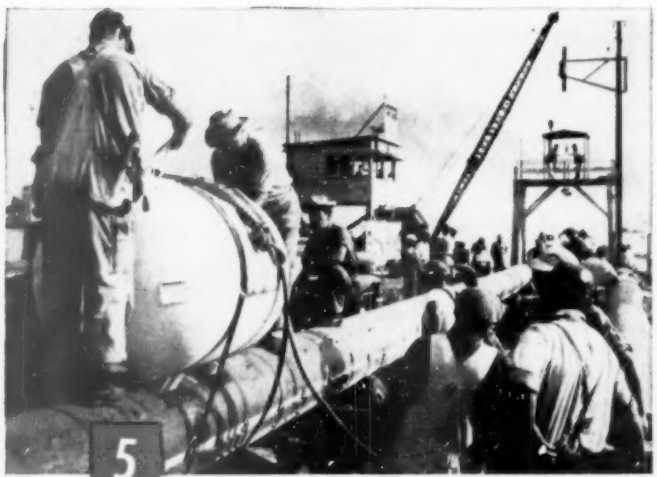
SOUND planning, a world of technical know-how, and the utmost care in selection of materials made possible the "Big Pull"—Lakehead Pipe Line Company's two 20-inch crossings of the 4-mile wide, 250-foot-deep Straits of Mackinac—the deepest and longest submarine lines ever laid.

Ingenious systems and devices had to be created for dredging, launching the pipe, adding buoyancy, pulling the pipe, filling it, and releasing the pontoons after the pipe was laid. Bad weather and rough water had to be overcome. The work, both ashore and afloat, had to be closely synchronized via a radio-telephone network, providing constant two-way communication as the pull progressed. And, of utmost importance, the pipe used had to have the unusual combination of high strength, extreme flexibility and maximum uniformity. It had to resist great pressures, absorb distorting and bending stresses; it had to have superior welding qualities; and for years to come it will have to be "trouble-free"—completely dependable. National Seamless Steel Pipe met these requirements and was the ultimate choice.

Twenty-seven foot lengths of 20-inch OD National Seamless Pipe, $^{13}/_{16}$-inch wall, were welded into eight sections, each approximately 2,500 feet long and weighing 220 tons. The pipe was coated and wrapped with two layers of fibre glass matting, and the lower perimeter was sheathed with timber lagging to protect it from possible damage as it scraped the bottom of the Straits.

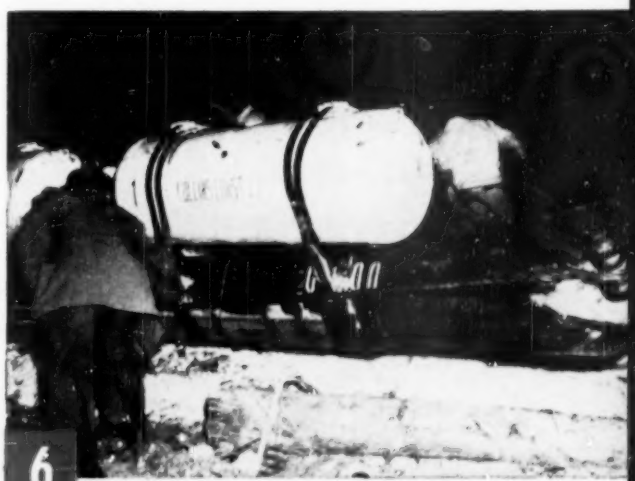
The first of the two 4-mile sections of pipe was pulled across the Straits in just less than seven days. The second crossing was accomplished in only 65 hours and 5 minutes. Bechtel Corporation of San Francisco, California, as the agent for the Lakehead Pipe Line Company, Inc., managed the history-making crossing, which was completed by Merritt-Chapman & Scott Corporation, general marine contractors; and Collins Construction Co. of Victoria, Texas, submarine pipeline specialists.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION
PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



5

STRAPPING FLOAT to section of 20-inch pipe being pulled across the Straits. Floats were placed at 66-foot intervals to prevent heavy pipe from dragging on the bottom. With floats attached, pipe had a negative buoyancy of six pounds per foot.



6

"OLD BULLHEAD," just after it emerged from the water at the south shore (Mackinaw City) landing site. It was greeted with triumphant shouts and a champagne christening by executives and employees involved in the operation.

USS NATIONAL SEAMLESS PIPE AND TUBES

USS

UNITED STATES STEEL

Tuboscope COMPANY

Tube-Tectors*

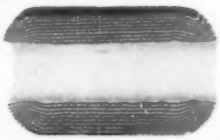
The strongest grip of any pipe protector and here's why...

Maximum strength in rubber is with the grain. Tube-Tector laminated construction causes stretch only in the direction of the controlled grain structure.

This tight grip with rounded end design for proper drainage, minimizes ring corrosion of drill pipe. Mud does not get between pipe and protector. Protection given to pipe by Tube-Tectors far exceeds their cost.

Laminated Construction

Full length grip



The straight bore design, laminated construction, and flow-contoured shoulders provide a tight grip from end to end to resist ring corrosion.

Tight end grip

The unrelieved bore made possible by laminated construction plus rounded end design, gives TUBE-TECTORS a superior ability to resist impact shocks.

TUBOSCOPE COMPANY*

2400 Holmes Road, Houston, Texas

*The trademarks "Tuboscope" and "Tube-Tector" are registered in the U. S. Patent Office.

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. . . and designed *Specifically* for the PETROLEUM, CHEMICAL, PETRO-CHEMICAL and ALLIED INDUSTRIES

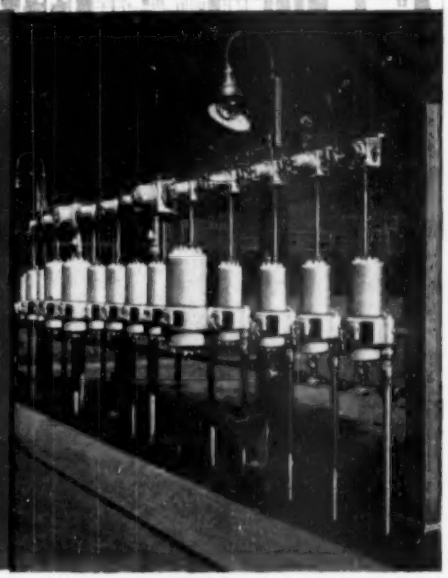
ARROW AH HART

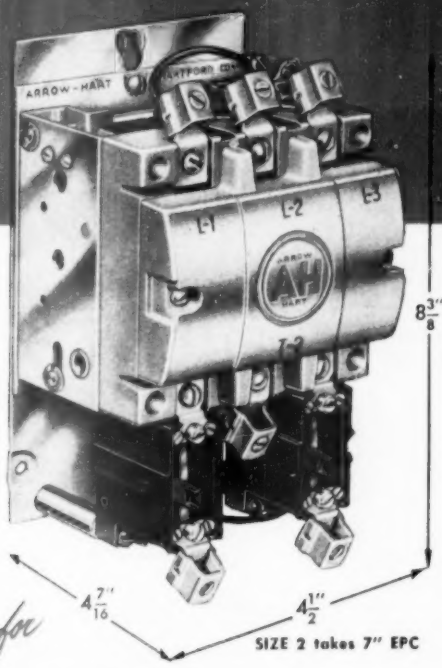
TYPE "RA-V"

Magnetic

MOTOR STARTERS

WITH VERTICAL OVERLOADS BELOW THE CONTACTOR





for use with the NEW CROUSE-HINDS M52 TYPE EPC EXPLOSION-PROOF CONDULET

SMALLER SIZE and LIGHTER WEIGHT Plus ADDED DEPENDABILITY

Like all other motor controls in the Arrow-Hart "RA" Line, the Type "RA-V", also makes use of the outstanding "Right Angle" Operating Mechanism. This exclusive Arrow-Hart feature, a revolutionary concept in motor control design, makes it possible to build superior performance and dependability and many other operating advantages into a starter radically smaller and lighter than any other control of equal rating.

For example . . . the A-H Type "RA-V" is the **only** Size 5 starter manufactured anywhere that can be housed in an EPC Condulet. The Type "RA-V" Size 2 requires only a 7" Condulet; "RA-V" Size 3 a 9" Condulet —instead of the 9" and 11" Condulets respectively required by all other Size 2 and 3 starters. The Arrow-Hart Size 4, as installed in an 11" Condulet, is our standard, full-sized starter offering full capacity, peak performance, and complete dependability . . . it is **not** an uprated Size 3 or other made-to-do adaptation. Here are important savings all down the line . . . in initial and installation costs, in smaller lighter mounting racks required and in lower building costs where control equipment is installed indoors.

- SMALLER, LOWER-COST CONDULETS
- FASTER, EASIER INSTALLATION
- REDUCED SIZE and COST OF MOUNTING RACKS
- SPACE SAVINGS, LOWER BUILDING COSTS

DON'T TAKE OUR WORD FOR IT . . .

Get complete information and see for yourself. Use this handy coupon to send for your copy of the illustrated "RA-V" Bulletin that gives full details including engineering and dimensional data.

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THERE'S A NATIONAL SUCKER ROD STRING FOR EVERY LOAD AND CONDITION!

Sucker Rod Grade	Yield Strength (PSI)	Tensile Strength (PSI)	Load Range	Condition
40	60,000-70,000	90,000-100,000	Moderate to heavy	Little or no corrosion
81	65,000-75,000	85,000-95,000	Moderate to heavy	Bad corrosion but little sulphide
92	90,000 minimum	115,000 minimum	Heaviest	Severe sulphide corrosion

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

low cost service

pumping conditions!

National Sucker Rods are engineered for maximum resistance to shock, corrosion, fatigue and impulse loads. There's no guesswork about this built-in stamina . . . it's the result of precision manufacturing backed by years of coordinated field and laboratory research by National's engineers.

Sucker rod research at National covers all factors affecting their service life. Whether this work involves a basic impulse factor for determining peak loads, or the selection of one of 50 paint coatings for best corrosion resistance, it's directed to give you the ultimate in sucker rod uniformity, dependability and economy.

National Sucker Rods are precision-manufactured with this same purpose. Only top-grade steels are specified for National Sucker Rods, and these are forged, upset and accurately threaded on specially-developed machines. To insure true straightness throughout shipment, National Sucker Rods are carefully and firmly separated in packing.

The National Supply Store nearest you has complete stocks of the sizes and grades of National Sucker Rods suited for your area. You'll also find a full line of couplings, polished rods, pony rods and other pumping supplies. Why not call today?

NATIONAL BLUE PRODUCTS

First in quality . . . First in supply service in oil country everywhere

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DIVISION OFFICES: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

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Allis-Chalmers ANNOUNCES

The NEW W-226 OILFIELD Engine*

● EXHAUST VALVE ROTATORS
Positive Valve Rotation
Cleans Stems and Seats.
Balanced Heat Distribution
All Add To Longer Valve Life!

● NEW "BY-PASS" COOLING SYSTEM
Automatic Temperature Control
and Quick, Uniform Engine
Warm-up

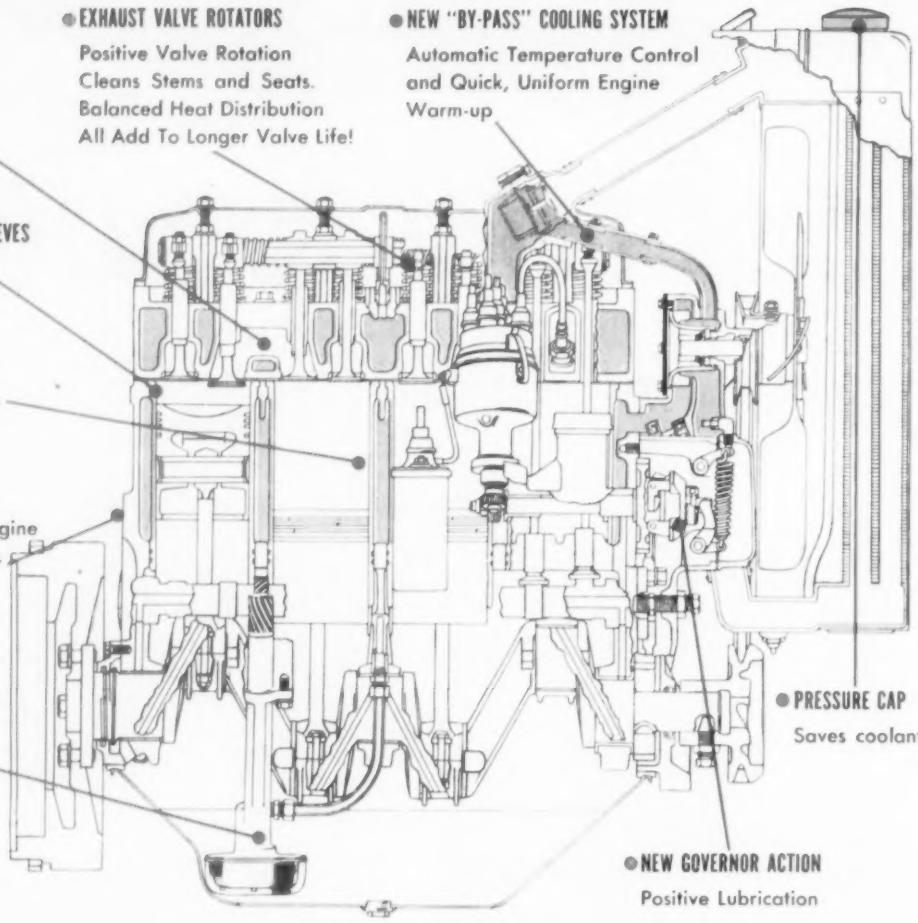
● BALANCED CARBURETION
Air and Fuel Balanced
To Big Power Capacity

● WET REMOVABLE CYLINDER SLEEVES
All-Around Even Cooling

● LOW RATE OF PISTON TRAVEL
Only 1050 Feet Per Minute

● NEW CYLINDER BLOCK
Short, Rigid for Longer Engine
Life — Cast Side Walls . . .
No Cover

● BIG CAPACITY OIL PUMP
Pressure Lubrication to All
Bearings, Rocker Arm &
Governor Assemblies



● PRESSURE CAP
Saves coolant

● NEW GOVERNOR ACTION
Positive Lubrication

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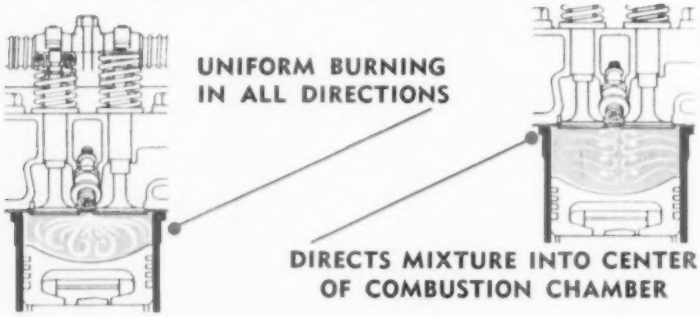
- **BORE — 4"**
- **STROKE — 4½"**
- **DISPLACEMENT — 226 Cu. In.**
- **COMPRESSION RATIO — 6.5:1 for high efficiency on natural gas fuel**
- **MAGNETO OR BATTERY IGNITION**



UNIFORM BURNING IN ALL DIRECTIONS

DIRECTS MIXTURE INTO CENTER OF COMBUSTION CHAMBER

COMPARE
1. Allis-Chalmers Quality
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With those of any other engine.

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They Say—

Holiday From Increases Needed

"We must hope for the day when it will be as politically popular to champion publicly the development of the oil and gas resources of Texas as it has been to court the farmer's political favor.

"The time has come when the unfair appeal to 'tax natural resources' must be resisted with every fact and method at our command. Right now the State of Texas collects more taxes from natural resources than all other states combined, and the oil and gas producers of Texas pay 95 per cent of it.

"Perhaps it's too much to hope for a cut in the disproportionate part of the tax load we are paying. However, certainly the time is at hand when the oil and gas producers of Texas should be given a holiday from increases."

Harry W. Bass, president, Texas Mid-Continent Oil and Gas Association, Dallas, in an address before association members.

Turkish Denationalization Approved

"The action of the Turkish National Assembly in passing its much-debated oil law will be heartily approved by friends of Turkey in the United States. Drafted by American and Turkish experts and based on a study of oil legislation in other countries, the law guarantees at least 50 per cent of net profits to foreign oil companies operating in Turkey.

". . . Turkey has deemed it wise to develop her oil resources with the aid of foreign capital. At the present time, when nationalization is on many tongues and other countries have the same problems as Turkey's to face, this bold example of denationalization merits the most serious study."

Editorial in the New York Herald Tribune.

Statistical Article Well Read

Sir:

We would like to take this opportunity to thank you for publishing the report describing our IBM system for obtaining statistical information and writing lease rental checks, which appeared in the February 8 issue, page 110, of your publication. We also wish to compliment you on the method of presentation.

Since the article appeared, we have had several requests from other oil companies who are desirous of establishing a system similar to the one we are now using. Other Union Oil personnel enjoyed reading the article.

C. L. Kendrick,
Supervisor, Lease Processing,
Union Oil Co. of California,
Bismarck, N. D.

Editor's Note: The Journal has published a considerable number of articles on the use of IBM systems for obtaining statistical information. Besides C. L. Kendrick's article, another report appears in the February 8 issue. It is "Electronic Calculator Solves Pipe-Line Problems," by Ernest A. Slade, and appears on pages 114-116.

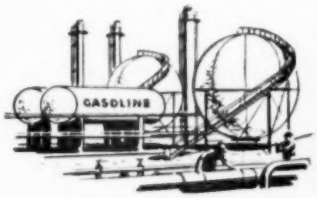
Journal Used as Text

Sir:

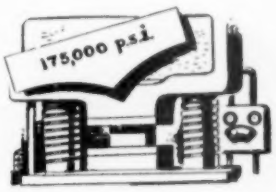
We are indeed grateful to you for your cooperation in supplying us with 20 copies of the "World Wide Oil Report" reprinted from a recent issue of The Oil and Gas Journal.

This material is most welcome and timely for our purposes as we are just about to discuss the geographic distri-

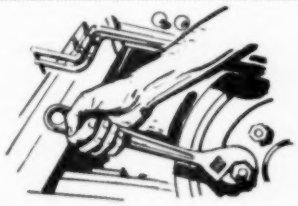
Why Berylco safety tools are your best buy



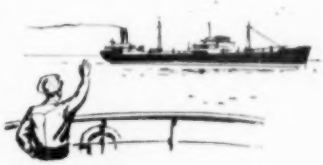
NONSPARKING—Berylco Safety Tools are safe to use in the presence of inflammable or explosive liquids, gases and dusts. They are approved by Factory Mutual Laboratories, and they conform to military and various commercial specifications.



STRONG & HARD—Berylco Safety Tools are closer to steel tools in strength and hardness because *they're made of high-performance beryllium copper*—safety tools made of inferior materials can bend and break easily. Replacement costs are far less.



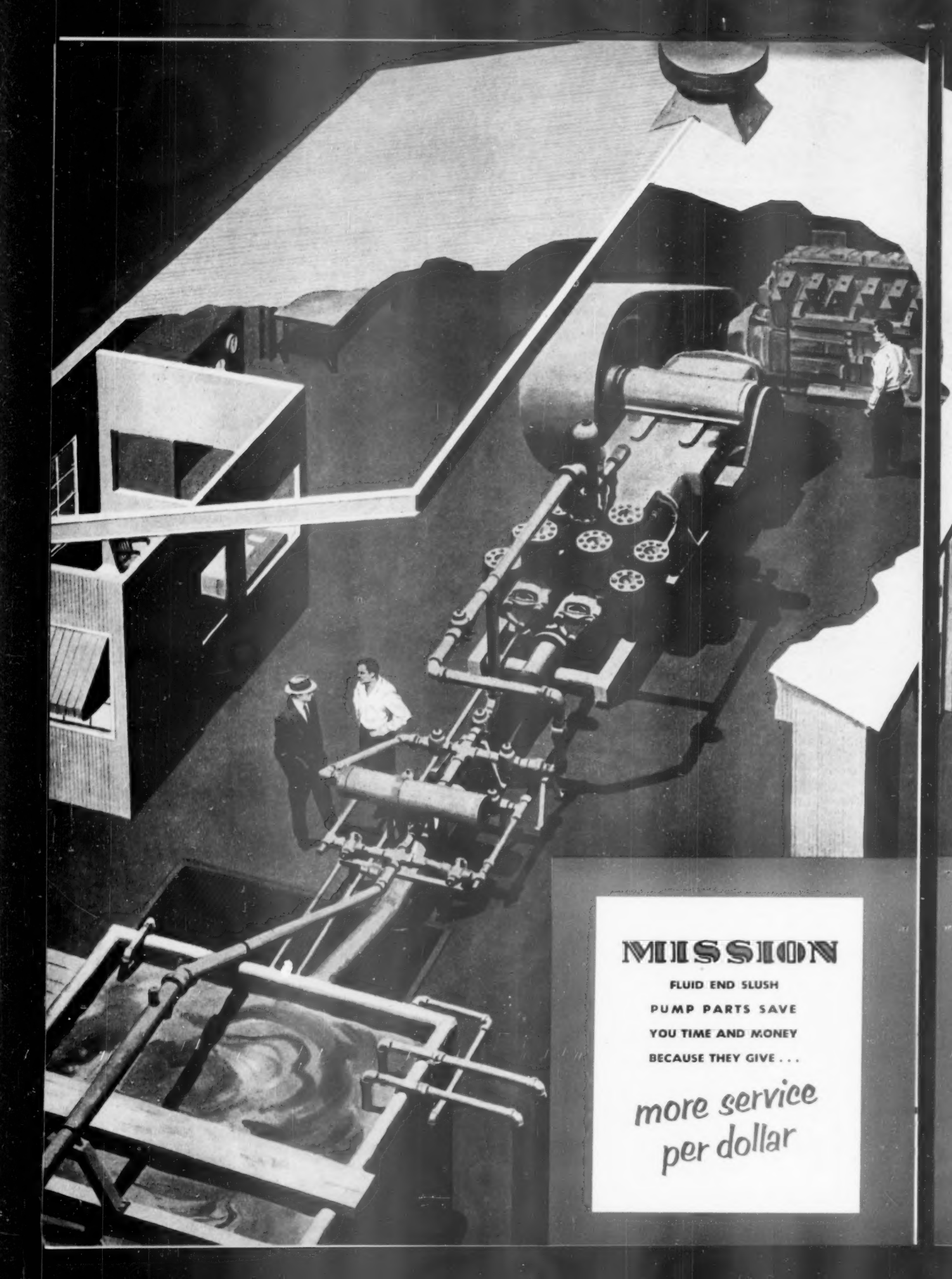
COMPACT—Run-of-the-mill safety tools make up for their lack of strength by size—and their size makes them heavy and hard to use. Berylco Safety Tools, on the other hand, are compact, comparatively light in weight, easy to handle, even in a cramped work space.



WON'T CORRODE—Salt water and damp air easily rust and pit steel tools, and cause moving parts to freeze. Berylco Safety Tools are noncorrosive—need no special care to keep them brand-new. They're ideal for marine use—give tankers, etc., double protection.

BERYLCO

Remember, too, Berylco Safety Tools are easily obtained. They're sold by regional warehouse distributors the country over. For the name of the one nearest you—and for a complete, illustrated catalog of over 400 tools—write THE BERYLLIUM CORPORATION, Dept. 4D, Reading 15, Pa.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FLUID END SLUSH
PUMP PARTS SAVE
YOU TIME AND MONEY
BECAUSE THEY GIVE . . .
more service
per dollar

Why these Mission Pump Parts never get a day off

Operated under actual field conditions on a 24-hour "tour," this test pump in the Mission plant at Houston is one more reason why your Mission Pump Parts work better in the field.

Practically every operating condition you can encounter in drilling any place in the world is rolled up into one simulated operation. For example, old mud taken from various field pits and containing cuttings and high sand content is used to duplicate actual conditions. The unit operates at temperatures up to 140 degrees which is higher than average normal field conditions and at pressures in excess of 1500 pounds.

This type of practical testing and probing on old and new design products in the Mission plant assures you that any pump that is all-Mission equipped has a far better chance for a longer, trouble-free life. So be practical about your slush pump parts purchases. Specify all-Mission to your supply store. You can be assured you will get more service per dollar with Mission products in your pumps.

MISSION MANUFACTURING CO.

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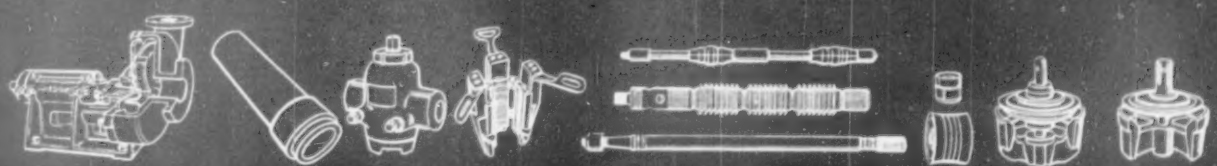
Export Office: 30 Rockefeller Plaza, New York



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Your Totco equipment is designed and built to take it. Shock . . . pressure . . . heat—none of these affects the accuracy of a Totco.

Even in the deepest and hottest wells your Totco will give continuous, reliable, accurate readings. It's rugged.

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Export—Lucey Export Corporation, New York City

bution of petroleum with our senior petroleum engineering students. A copy of the report will be placed in the hands of each of our seniors with your compliments.

We make continued use of The Oil and Gas Journal in our work here at the University of California and our students become well acquainted with it by frequent references and we regularly advise them to become subscribers.

Lester C. Uren,
Professor, Petroleum Engineering,
University of California,
Berkeley, Calif.

New Process Is Old Stuff

Sir:

I would like to correct what I consider a misstatement in your article, "Polythene From Heavy Resid" *(January 11, page 64)*.

I have information, which I am sure can be substantiated by Harold S. Kendall of Dow Chemical Co. at Midland, Mich. . . . that Dow Chemical Co. at Midland:

1. Produced ethylene from kerosene distillate (or No. 1 fuel oil) in 1929 and used it for the commercial production of ethylene dichloride.

2. Produced ethylene from reduced crude oil or fuel oil in 1936 and used it for the commercial production of ethyl chloride, ethylene glycol, ethylene dichloride, and ethyl benzene.

3. Produced ethylene from crude oil in 1942 and used it for the production of the products named above as well as for ethylene dibromide.

All these units produced ethylene by thermal cracking. . . .

Hugh Fairclough,
New Castle, Del.

Search for Security

"It is essential as we make our way through the squalls and alarms of 1954 that we keep our eye on the main goal, which is the continuation of our progress to greater productivity, to greater abundance, to new products for the betterment and simplification of our lives.

"I do not think this requires us to forsake the search for what we call security. It does require us to know precisely what we mean when we define security as our goal.

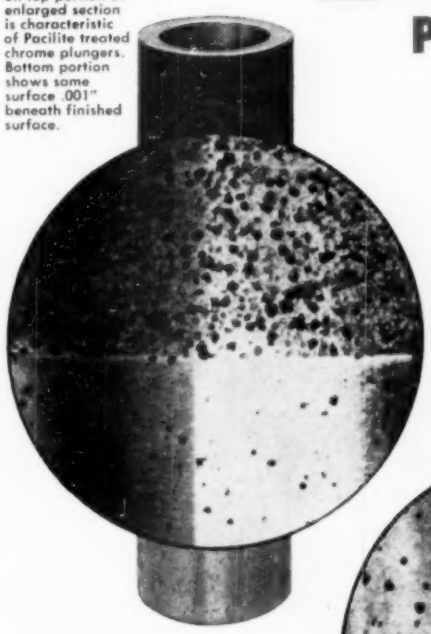
". . . And today, in accepting the risks and hazards implicit in industrial progress, we reach for the only real security—the abundance that enterprise will bring."

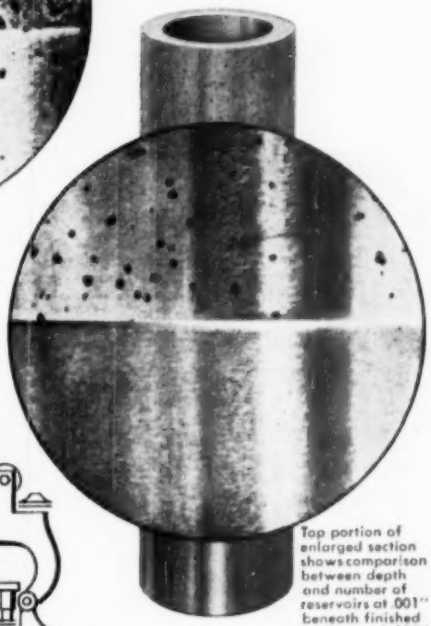
Crawford H. Greenewalt, president, E. I. du Pont de Nemours & Co., in a speech before the Commonwealth Club of San Francisco.

The New Pacific

PACILITE (TRADE MARK) PLUNGERS FOR DEEP OIL WELL PUMPING...

The number of surface reservoirs on top portion of enlarged section is characteristic of Pacilite treated chrome plungers. Bottom portion shows same surface .001" beneath finished surface.





Top portion of enlarged section shows comparison between depth and number of reservoirs at .001" beneath finished surface and .005" where controlled etching has eliminated reservoirs.

HAVE MILLIONS OF MICROSCOPIC PORES that actually soak up lubricants!

Pacific Pacilite process is a method of control etching a multitude of minute surface reservoirs to provide maximum retention of lubricants after the chrome plated plunger is ground to desired size. Result is much longer plunger life and virtual elimination of sticking and galling. Pacilite treatment also relieves high tensil plating stress and reduces possibility of cracking or shearing under heavy shock loads. For complete details write for Technical Bulletin No. 201.

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ONE OF THE DRESSER INDUSTRIES
HUNTINGTON PARK, CALIFORNIA

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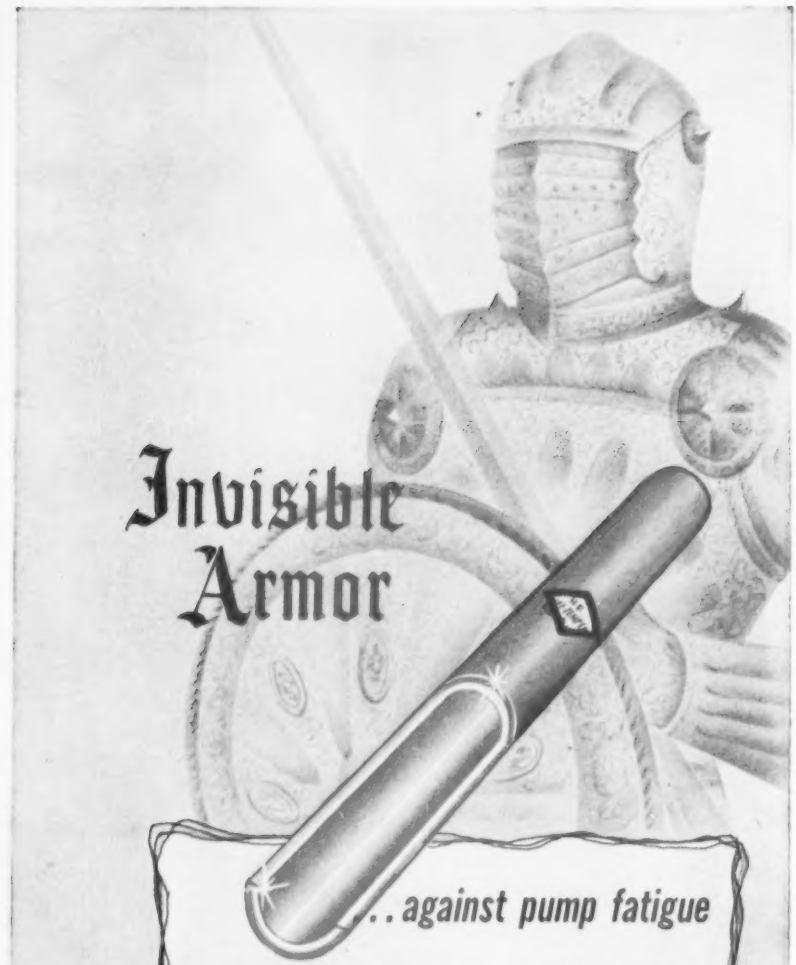
Offices in All Principal Cities



You can't always see them, but Harbison-Fischer Heavy-Duty Pumps have a lot of features that overcome the principal causes of pump failures in deep wells. Extra strength is built into all parts subject to wear and stress, critical parts are heat-treated for maximum hardness, and the barrel tube is a single piece of seamless steel tube with a double-thick wall for added rigidity.

Each barrel tube is run through a special electronic heat-treating process that produces a wearing surface of uniform hardness on the inside, but allows the outside to remain ductile. Thus damage from hard wear and the abrasive action of entrained solids in the fluid are minimized by the heat-treated sealing surface, and the ductility of the thick-wall tube allows a long, even plunger stroke without any flexing or binding.

Harbison-Fischer heavy-duty rod and tubing pumps are available in a full range of A.P.I. types with a wide selection of plungers—chrome-plated, hardened steel, one-piece, sectional, or H-F Flexite Ring. Your store or one of our factory representatives will be glad to give you complete details without obligation.

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Harbison-Fischer Heavy-Duty Pumps—
Electronically Heat-Treated for
Protection Against Wear and Abrasion

HARBISON-FISCHER MFG. CO.—FT. WORTH, TEXAS

CALENDAR

MARCH

29-30 International Geological Conference, University of Texas department of geology and Institute of Latin American Studies, Austin.

29-31 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

APRIL

4- 6 Texas Independent Producers and Royalty Owners Association, Rice Hotel, Houston.

5- 7 American Society of Lubrication Engineers, Netherland-Plaza Hotel, Cincinnati.

6 New Jersey Section of the Instrument Society of America, sixth annual symposium, Essex House Hotel, Newark, N. J.

6- 8 Petroleum Industry Electrical Association, annual convention and exhibit, Adolphus and Baker Hotels, Dallas.

7 Packaging Institute, annual spring luncheon, Hotel Dennis, Atlantic City, N. J.

8- 9 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Townsend Hotel, Casper, Wyo.

8- 9 Second annual instrumentation conference, Louisiana Polytechnic Institute, Ruston, La.

12-15 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, joint annual meeting, Kiel Auditorium, St. Louis.

13-15 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

14-16 National Petroleum Association, fifty-first semiannual meeting, Cleveland Hotel, Cleveland.

15-16 Sixth National Personnel Conference of the Gas Industry, American Gas Association and Southern Gas Association, Edgewater Beach Hotel, Chicago.

17 Fourth John Zink Process Heating Seminar, John Zink Burner Co. plant, 4401 S. Peoria, Tulsa.

19-21 National Purchasing and Stores Conference, sponsored by the American Gas Association, Atlanta, Ga.

20-23 Distribution, Motor Vehicles and Corrosion Conference, Operating Section, American Gas Association, Mount Royal Hotel, Montreal.

21-23 1954 Southern Industrial Wastes Conference, Manufacturing Chemists Association Southern Association of Science and Industry, and the Texas Chemical Council, Houston.

21-23 Natural Gasoline Association of America, thirty-third annual convention, Baker Hotel, Dallas.

22 Illinois Oil and Gas Association, annual membership meeting, Hotel Emmerson, Mount Vernon, Ill.

26-28 Southern Gas Association, annual convention, Houston.

27 Distillation in Practice, second of an Experience in Industry series, Philadelphia-Wilmington section of the American Institute of Chemical Engineers and University of Pennsylvania, University Museum, Philadelphia.

MAY

2- 4 Independent Petroleum Association of America, midyear meeting, Cosmopolitan Hotel, Denver.

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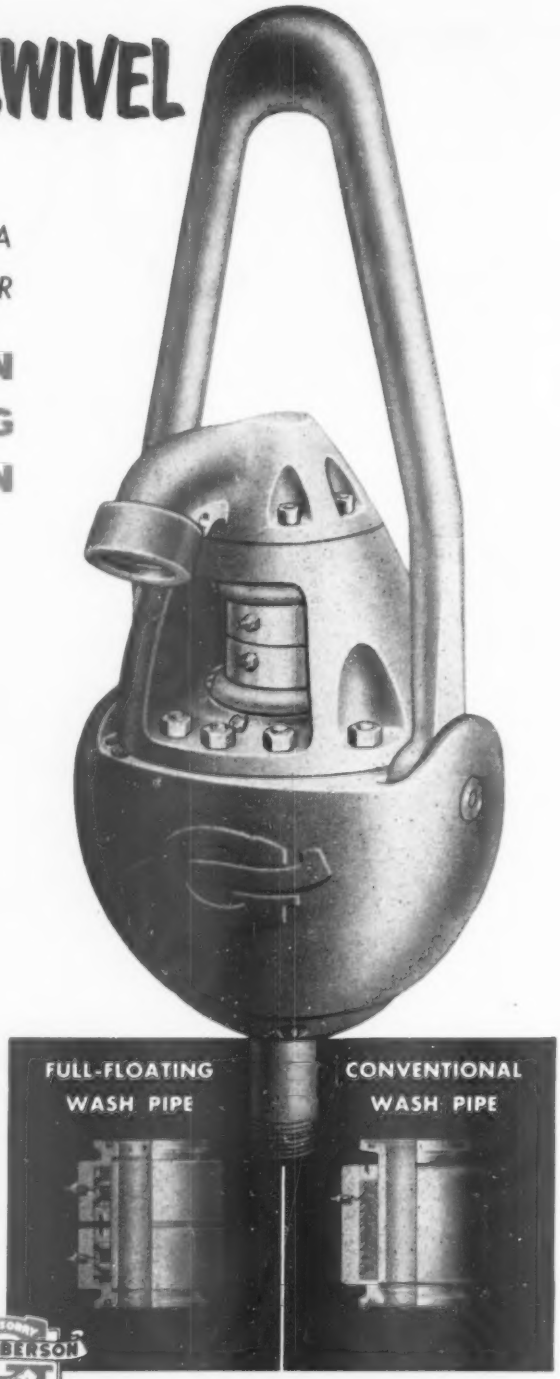
GUIBERSON 65 TON SWIVEL

A TRIPLE DUTY TOOL IN A CLASS BY ITSELF FOR

REVERSE CIRCULATION
GAS DRILLING
CONVENTIONAL CIRCULATION



For Reverse Circulation

Guiberson's 65 Ton Swivel gives you triple your money's worth because it does triple duty in the field. Used with Guiberson's famous Full-Floating Wash Pipe, it is without equal for slim hole drilling, work-overs and cleanout work and for drilling in with reverse circulation.

For Gas or Air Drilling

For gas or air drilling, the 65 Ton Swivel with Full-Floating Wash Pipe is gaining rapid popularity for its time and labor saving efficiency. Wash Pipe never needs adjustment and requires no more attention than regular greasing. Packing assembly is fast and easy to replace, goes in without disconnection of gooseneck or hose.

For Conventional Circulation

When used with conventional washpipe and packing, the 65 Ton Swivel does a top-notch job of conventional circulation. But whether you need this "workhorse" for one job or all three, it will give you rugged, dependable service. Buy it with either the Full-Floating Wash Pipe or Conventional — add the other when and as needed — you'll save time and money in the field.

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3- 5 American Geophysical Union, thirty-fifth annual meeting, National Academy of Sciences, Washington, D. C.

3- 5 Air Pollution Control Association, annual meeting, Patten Hotel, Chattanooga, Tenn.

6- 7 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Statler Hotel, Los Angeles.

9-12 Liquefied Petroleum Gas Association, annual convention and trade show, Conrad Hilton Hotel, Chicago.

10-12 Ninth annual Purdue Industrial Waste conference, Purdue Memorial Union, Lafayette, Ind.

10-12 American Petroleum Institute, Division of Transportation, Products Pipe Line Conference, Warwick Hotel, Philadelphia.

10-13 American Petroleum Institute, Division of Refining, midyear meeting, Rice Hotel, Houston.

14-15 Interstate Oil Compact Commission, General Oglethorpe Hotel, Savannah, Ga.

16-19 American Institute of Chemical Engineers, Springfield, Mass.

17-19 American Petroleum Institute, Division of Marketing, midyear meeting, Cosmopolitan Hotel, Denver.

20-21 Kentucky Oil and Gas Association annual meeting, Lafayette Hotel, Lexington, Ky.

24-26 American Gas Association, production and chemical conference, William Penn Hotel, Pittsburgh.

27-28 Natural Gas and Petroleum Association of Canada, Prince Albert Hotel, Windsor, Ont., Canada.

31-June 5 American Petroleum Institute, Division of Production, midyear committee conference, St. Francis Hotel, San Francisco.

JUNE

2-4 Southern Gas Association, short course in gas technology, Texas College of Arts and Industries, Kingsville, Tex.

3- 4 Pennsylvania Grade Crude Oil Association, thirty-first annual meeting, Hotel William Penn, Pittsburgh.

6-11 Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

13-18 American Society for Testing Materials, annual meeting and exhibit, Sherman and Morrison Hotels, Chicago.

17-19 American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

20-24 Canadian Gas Association, Banff Springs Hotel, Banff, Alta., Canada.

JUNE 20-
JULY 4 Seventh annual Conferences on Personnel Administration and Managerial Development, Industrial Relations Section of the California Institute of Technology, California Institute of Technology, Pasadena, Calif.

25-26 Southern Gas Association, transmission management conference, Hotel Adolphus, Dallas.

27
July 1 Petroleum Equipment Suppliers Association, nineteenth annual meeting, Manoir Richelieu, Murray Bay, Que., Canada.

JULY

23 Southern Gas Association, communications conference, Rice Hotel, Houston.

24 Southern Gas Association, dispatchers' conference, Rice Hotel, Houston.

to all NATURAL GASOLINE MEN
GREETINGS
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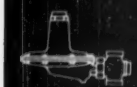

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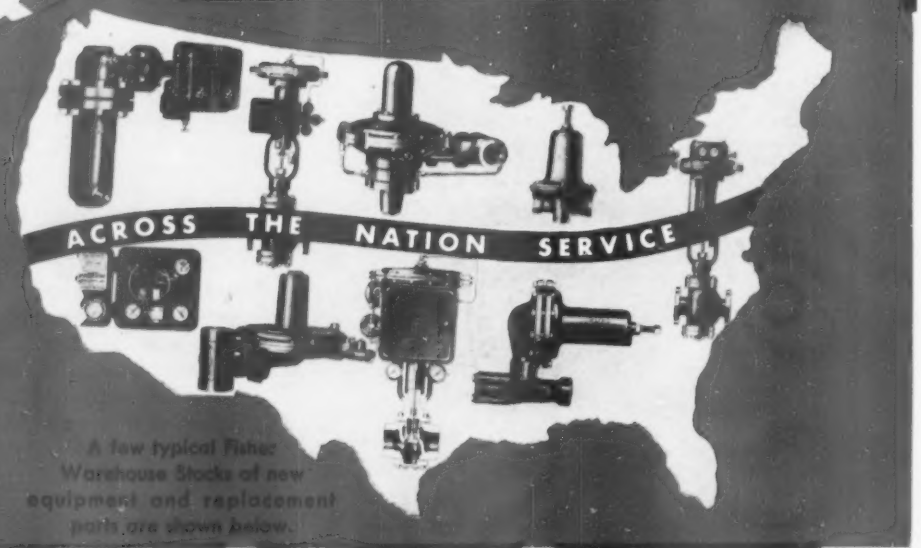
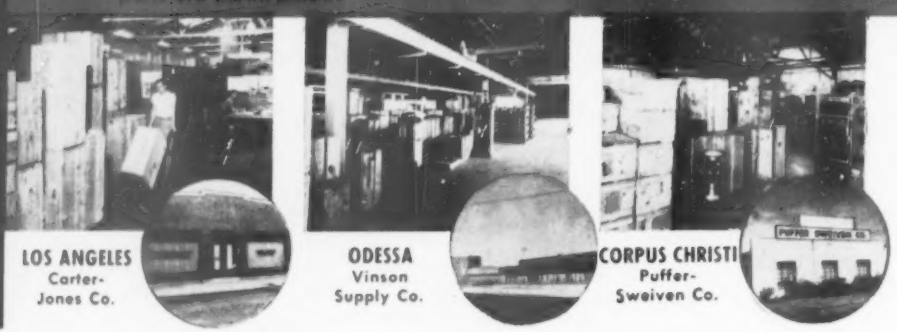


A few typical Fisher Warehouse Stocks of new equipment and replacement parts are shown below.



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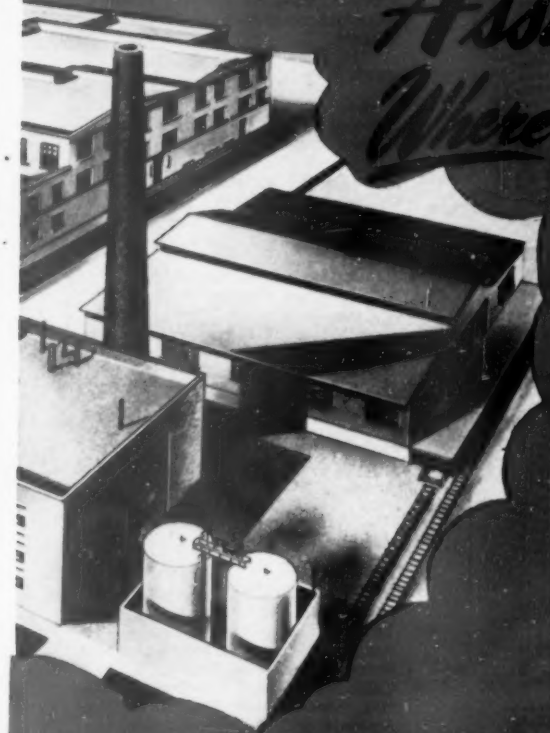

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* Indicates Field Stocks

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NEW ORLEANS
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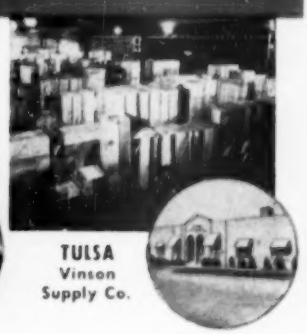

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STYLE A—Strong metal frame, on-line temples, with metal reinforcing bar or pearloid brow rest. Rocker nose pads. Exceptionally comfortable. (With sideshields, Style AS.)

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STYLE AV—Modern metal frame with Hi-Line® temples, metal reinforcing bar. Rocker nose pads add extra comfort. A popular style of outstanding value. (With sideshields, Style AVS.)

STYLE WK—Sturdy flesh-color butyrate frame—"keyhole" bridge. Choice of spatula or half-plastic, half-cable temples. Adjustable for perfect fit. (With sideshields, Style WKS.)

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WILLSON PRODUCTS, INC., 204 Washington St., Reading, Pa.

AUGUST

17-19 Society of Automotive Engineers, Inc., international West Coast meeting, Georgia Hotel, Vancouver, B. C., Canada.
20 Southern Gas Association, natural-gas processing conference, Herring Hotel, Amarillo, Tex.
21 Southern Gas Association, pipe-line operations conference, Herring Hotel, Amarillo, Tex.

SEPTEMBER

7-9 Association of Desk and Derrick Clubs of North America, annual convention, Banff Springs Hotel, Banff, Alta.
9-11 Interstate Oil Compact Commission, Omaha, Neb.
12-16 American Institute of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.
15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.
16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.
25 Southern Gas Association, compressor-station conference, Captain Shreve Hotel, Shreveport, La.
27-29 Electrical Conference for Petroleum Industry, American Institute of Electrical Engineers, Mayo Hotel, Tulsa.

OCTOBER

2 Southern Gas Association, right-of-way conference, Peabody Hotel, Memphis, Tenn.
4-6 Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.
7-8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.
9 Southern Gas Association, field production of natural gas roundtable, Rice Hotel, Houston.
11-13 American Gas Association, annual convention, Atlantic City, N. J.
11-13 American Association of Oilwell Drilling Contractors, annual meeting, Biltmore Hotel, Los Angeles.
12-15 Eighth National Chemical Exposition, Chicago Coliseum, Chicago.
14-17 Permian Basin Oil Show, Odessa, Tex.
16 Southern Gas Association, transmission management conference, Rice Hotel, Houston.
17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.
24-26 Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.
26-27 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.

NOVEMBER

4-5 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

28-Dec.

3 American Society of Mechanical Engineers, Statler Hotel, New York.

DECEMBER

2-4 Interstate Oil Compact Commission, winter meeting, Drake Hotel, Chicago.

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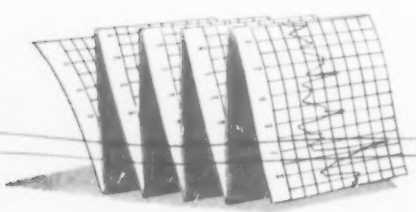

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JOURNALLY Speaking

Reading on Writing

THIS page wasn't intended to contain plugs for other people's books, but since we have repeatedly violated every rule and precedent here at one time or another we intend to use this space for just that this week.

What prompts us to do this is the considerable interest evinced by a number of readers in the squib we had on "Fog Factor" in our March 1 column. Apparently quite a few engineers and technical men (or at least their bosses) in this industry are concerned with the difficulty of reading much of the technical material which crosses their desks, for our reference to a mathematical formula for measuring the readability of an article got wide response.

So perhaps we can help some brethren of the oil fraternity by a few pointers on how to write better.

In the first place, writers are made, not born. Anybody who got through high school can become a good writer if he works at it. No genius or gift is required; just a lot of hard work. We're not talking about the kind of creative imagination that produces poems and fiction stories—just plain, workaday writing of the business world, the kind of writing intended to convey a fact or an idea from one mind to another. Good writing of this kind is writing which gets the idea across with the least possible expenditure of time and effort on the part of the reader and leaves him unconfused and fully informed. You'd be surprised how much of the stuff you read every day fails to meet this simple test—or would you?

The best way to learn to write is to write—write a lot and then rewrite it and rewrite again, until clear writing becomes second nature to you.

The next best way is to read what some experts say about writing, and here's where we start plugging some books that have helped us and helped others.

If you have a fondness for fancy phrases and trite expressions, read "The Art of Readable Writing," by Dr. Rudolph Flesch, who also wrote the better-known "The Art of Plain Talk." Dr. Flesch is an Austrian who learned English as an adult and thus didn't inherit the speech habits most of us have. He made an objective study of our language that is revealing and refreshing to anyone interested in getting the fuzziness out of his writing.

Dr. Flesch was hired by the Associated Press to teach its professional writers how to write better—and you can imagine how gracefully those hard-boiled reporters accepted lessons from an upstart foreigner. It darn near busted up the AP. But after the dust settled, the AP staffers discovered that they could learn a few things, and AP dispatches have been easier to read ever since. If Dr. Flesch could teach things to men who make their living writing, his book might hold a few pointers for those who have to write just now and then.

Perhaps even better for technical men is "Clear Writing for Easy Reading," by Norman G. Shidle. Shidle is editor of the Journal of the Society of Automotive Engineers, an organization which doubtless produces as much long-haired writing as any in the country. Yet his little book is the best we've seen on how to put technical material into simple words.

Also excellent is "The Technique of Clear Writing," by Robert Gunning. Gunning invented that fog formula quoted in our March 1 piece, though both Flesch and Shidle give somewhat similar mechanical devices for measuring ease of reading. Gunning operates a consulting service on writing, and in this capacity has been employed by some of the biggest industrial firms and publishing houses.

So you see these authors aren't crackpots, and their methods have been worth money to professional writers. We don't get a commission on the sale of these books, but we really think they will help any of our readers who may be interested in writing reports that are easier for their bosses to read.

If that doesn't work, we'll consider giving private lessons—for an exhorbitant fee.

—*Henry D. Ralph.*

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We can find oil with a pencil

SOME people are going to take a quick look at the A.P.I. report on crude reserves published last week and draw some erroneous conclusions.

They will say that we are running out of oil because "real" discoveries were only 591,000,000 bbl. last year, while production was 2.3 billion barrels. They will disregard the very much larger additions to reserves classified as extensions of old pools and revisions of previous estimates.

A few years ago, as an argument for federal control of the industry, Secretary Ickes scoffed at extensions and revisions as "finding oil with a pencil instead of a drill." The implication was that the industry was somehow faking its estimates and wasn't really adding to reserves.

THAT is not true. It is proof of the industry's conservatism that only a small reserve is initially assigned to a new discovery. It may take from one to a dozen years after completion of the first well to define the area of a new pool and evaluate its producibility. So annual revisions of reserve estimates are entirely proper.

In a different, but very real sense, the industry does find oil "with a pencil." This pencil is the collective calculating done by the industry's engineers and other scientists—its constantly improving technology in finding and producing oil.

Only a small part of our reserves is discovered with the drill in the sense of random wildcatting. A very large part has been established through scientific methods of determining where to drill and what zones to test, methods of completing and producing wells, methods of reservoir control and secondary recovery. A million barrels of additional oil made recoverable from a known field is just as much an addition to our reserves as a new field, even though the "discovery" was made in a laboratory.

NEW gushers all over the map might be a more dramatic demonstration that we aren't running out of oil, but actually the public should be even more reassured by knowledge of the industry's ability to get more and more oil out of known deposits. If a bird in hand is worth two in the bush, a method to get twice as much oil from a given field is as good as a new field of the same size.

Last year the industry increased proved reserves, by one means or another, by considerably more than the amount withdrawn from the ground. It makes no difference to consumers whether this was accomplished with a drill, a doodlebug, or a pencil in the hands of a thousand industry research men. The oil is there, and its recoverability is established.

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THIS WEEK... ...IN THE NEWS

ARRIVAL OF SPRING gives a fellow the fishing itch, but Amos Dufrene suffers from that malady more than most. Dufrene, member of the Louisiana Conservation Commission staff, provides Cities Service Co. seismic crews in the Mississippi River Delta area with technical advice on preservation of marine life during shooting operations. What would be more natural than Dufrene spending his off hours fishing from a recording boat. He's just improving his personal technique with marine life.

PRODUCTION—Crude output on West Coast begins downward trend for first time in more than 3 years. . . . Principal causes are oversupply of heavy fuel, reduction in drilling activity. . . . ¶First published information on Atlantic Refining's imbibition experiment in Spraberry indicates novel technique will be successful. . . . ¶Tex-Harvey given permission to start second imbibition project. . . .

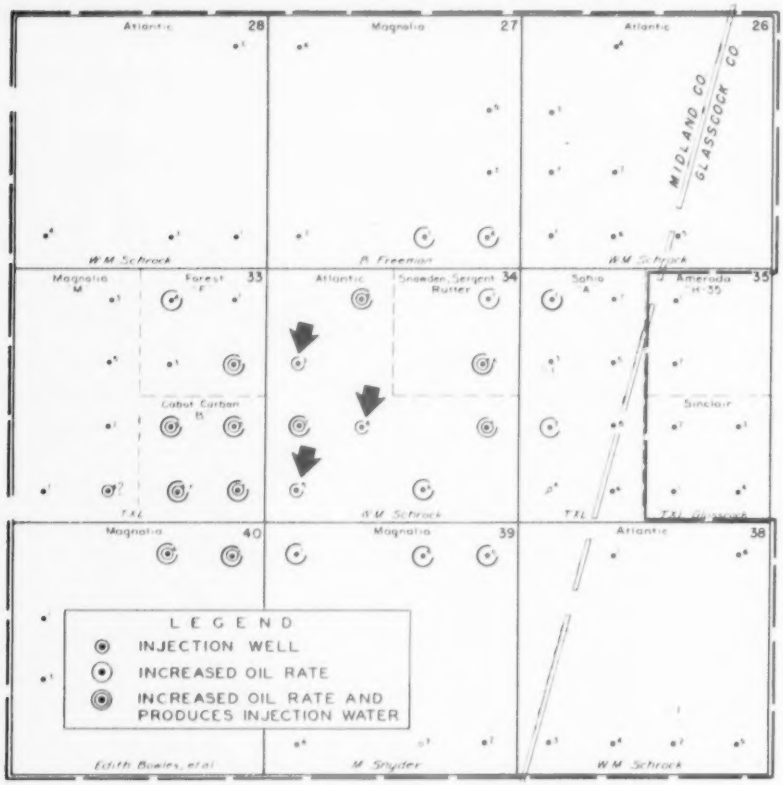
PIPELINES—Texas Eastern proceeds with plans to convert the Little Big Inch gas line to products. . . . Detailed plans have not yet been completed but engineering work is under way. . . . ¶North Dakota Natural Gas presents revised plans for transmission line to North Dakota Public Service Commission. . . . Overestimate of anticipated demand cited for changes. . . . ¶Industry consultant panel prepares recommendations to NSC for emergency pipeline from Gulf to East Coast. . . .

EXPLORATION—Four West Coast companies join forces to develop methods of drilling in deep waters off California. . . . Contract let for design and construction of platform to be used in water perhaps as deep as 250 ft. . . . ¶Shell moving additional rigs into vicinity of indicated Nevada discovery. . . . ¶New exploration method—continuous velocity logging—licensed by Magnolia to Seismograph Service. . . . ¶West Coast group announces plans for wildcat in Cook Inlet area of Alaska, to be spudded this summer. . . . Rig already shipped from Texas. . . .

IMPORTS—Companies reporting to Texas Railroad Commission scale down import estimates for second quarter by 1.7 per cent. . . . Reports estimate average of 948,200 bbl. daily for second quarter. . . . Crude imports by the 16 reporting companies have averaged 98 per cent of the Census Bureau total over past 4 months. . . . ¶Department of Commerce figures reveal January imports and exports both decreased. . . . Total imports dropped 61,000 bbl. daily from December average. . . . Residual imports increased slightly over December but were well below average for December 1952. . . .

ACTIVITY—Production of crude and lease condensate averaged 6,435,250 bbl. daily for week ended March 20, up 4,550 bbl. daily. . . . ¶Total well completions decreased 41 wells to 988 for the week. . . . ¶Wildcat completions totaled 197 compared with 191 for previous week and 203 for same week last year. . . . ¶Rotary rigs operating in the United States increased 7 rigs during the week ended March 22 to 2,605. . . .

TRENDS—Stocks of the four major products dropped 8,457,000 bbl. in the first 3 weeks of March compared with a decrease of 7,208,000 bbl. last year. . . . The larger stock reduction was due to lower refinery runs rather than to important increases in demand. . . . Runs for the past 3 weeks were under last year by 91,700 bbl. daily or 1,925,000 bbl. for the period. . . .



RESULTS OF IMBIBITION are shown in this Atlantic Refining map. Question mark indicates the well at left may be producing injection water. Arrows indicate injection wells.

Imbibition Successful

Study of results in Atlantic's pilot project in Spraberry field indicates formation is imbibing water, freeing oil

Robert J. Enright

MIDLAND, Tex.—Evidence collected so far by Atlantic Refining Co. on its experimental water-injection in the Driver area of Spraberry Trend Area field, Midland and Glasscock counties, West Texas, proves without a doubt that imbibition is taking place.

It so far has resulted in increased oil production, or at least leveling off of previous sharp production declines, in 21 of the 64 oil wells in the 5,440-acre project area. Injection water is being produced in 11 wells and possibly a twelfth.

Increased oil production has shown up in wells three-quarters of a mile from the input wells—injected water in wells ½ mile removed from input wells.

Why it's important . . . Spraberry operators, all of them plagued with exceedingly sharp rates of decline in oil production, have been eying the Atlantic project with considering interest.

Some practical method for increasing ultimate recovery from the abnormally tight Spraberry pay is badly needed if the wells are ever to pay out. This is in spite of improvements in fracturing techniques, Texas Railroad Commission approval of wider spacing, and higher crude price.

A recent survey conducted by a major firm over an area encompassing 30,000 acres of Spraberry production revealed that cumulative production from this acreage would average only 380 bbl. per acre under primary production and that the average well was producing only 7 bbl. of oil per day.

How imbibition works . . . Virtually all the permeability in the Spraberry reservoir is concentrated in a large number of native fractures about 3 to 4 ft. apart and averaging about 0.002 in. wide.

Because of this fractured condition and the very tight matrix, oil cannot be forced from the matrix by means of conventional water flooding or gas injection. Such methods would result in critical channeling and bypassing through the fractures.

The imbibition technique involves filling these same troublesome fractures with water. The water is then soaked into the fine pores of the tight matrix rock by capillary action. As the water is soaked into the rock, or imbibed, the oil is forced out into the fracture.

This phenomenon was proved by Atlantic in qualitative tests in the laboratory by simply dropping an oil-saturated piece of Spraberry matrix into a beaker of water. The water was imbibed, and oil forced out to collect as droplets on the surface of the sample.

Proof of imbibition . . . The possibility that increases in oil production might be resulting from common waterflood action can be ruled out by merely looking at the volume of water injected to date, the estimated fracture space in the project area, and the volume of injection water produced to date.

Fracture space in the roughly 800-acre area where increased fluid production has been noted has been estimated at about 40 bbl. per acre, or a total fracture volume of 32,000 bbl.

So far more than 700,000 bbl. of water has been injected through the three injection wells on Atlantic's W. M. Schrock lease in Tract 34 since the pilot project was launched in November 1952. Only about 33,000 bbl. of the water injected has been produced to date.

This means that about 635,000 bbl., roughly 90 per cent, of injected water must have been imbibed into the Spraberry matrix. Had not imbibition taken place, increased fluid production would have resulted over a much wider area—roughly 16,000 acres based on the 40-bbl.-per-acre estimate of fracture space.

Response to project . . . Four wells either showed increased oil production or began to level off from previous sharp declines in producing rates late in 1952. These were: Cabot Carbon TXL "B" 1, James B. Snowden et al.

Facts on Atlantic's Imbibition Project

INJECTION STARTED	**Nov. 1952**
WATER INJECTION DATA:	
No. Injection Wells	**3**
Total Injection, bbl.	**700,000**
No. Oil Wells Producing Injection Water	**11**
OIL PRODUCTION DATA:	
Project Area, acres	**3,840**
Oil Wells, No.	**64**
Increased Fluid Production Noted, acres	**800**
Some Increase in Oil Production, No. Wells	**21**
Best Oil Well Increase, bbl. per day (Magnolia's D. T. Bowles 2, Tract 40)	**from 29 to 78**
Best Lease Increase, bbl. per day (Cabot Carbon's four TXL wells, B Lease, Tract 33)	**from 30 to 100**

Schrock "34" 2-A, and Magnolia Petroleum Co.'s D. T. Bowles 2 and 4.

Twelve other wells responded similarly during 1953. It was observed that the wells which showed increases in fluid production were located generally along a northeast-southwest line, indicating that Spraberry fractures in the area trend in this direction.

Oddly enough, Atlantic's W. M. Schrock "34" 7, located equidistant from the three Schrock injection wells in Tract 34 and selected as the key observation well, showed no evidence of injected water or increase in oil production until recently, and then only an insignificant amount.

Best performer so far has been Magnolia's D. T. Bowles 2 in Tract 40 southeast of the southernmost of the three injection wells. Production of this well in November 1952 was about 30 bbl. of oil daily. Just 2½ months earlier it had been producing 152 bbl. daily. With the start of the imbibition project, production began to rise, and by the first of February it was again up to 78 bbl. daily. The gas-oil ratio, meanwhile, had dropped from 2,400:1 to 400:1.

Production gains of other wells, though not so spectacular, were nevertheless substantial.

Water injection . . . Meanwhile, the volume of water injected was being increased. In November 1952, the two original Schrock input wells were taking a total of about 400 bbl. daily.

A third injection well was put in service in January 1953 and total input boosted to 600 bbl. daily. By May 1953, the input rate had reached approximately 2,100 bbl. daily. This rate is still being maintained.

No water was injected for about 2 weeks in January due to mechanical difficulty with the engine and pump supplying water. The injection water is obtained from a shallow fresh-water sand and filtered before it is used.

Atlantic going slow . . . Atlantic is not making any predictions about how imbibition would perform elsewhere. Nor will the company make any public analysis of the encouraging results obtained so far in its pilot project.

A big reason for the company's attitude is that it cannot yet be sure how much of the production increases in test wells is due to the April-December 1953 shutdown of most Spraberry wells for excessive waste of casing-head gas. Wells in the project area were exempt by special order of the Texas Railroad Commission.

Atlantic also wishes to swap its views and analysis of the results of the experiment with other major producers in the area before reaching any final conclusion. If the final analysis merits it, the pilot doubtless will be expanded. Permission to carry on the project for another year was granted Atlantic by the Railroad Commission in December.

Imbibition Approved

Tex-Harvey plans five-well project near Atlantic pilot

AUSTIN.—The second water-imbibition secondary-recovery experiment was approved last week by the Texas Railroad Commission.

It will be conducted by Tex-Harvey Oil Co. on its Floyd 15 lease in the Tex-Harvey (Floyd sand) area of Spraberry Trend Area field—just a few miles to the north of Atlantic Refining Co.'s original pilot project in the Driver area of the same field.

The commission order permits the company to inject 200 bbl. per day of salt water through each of five wells—the company's Floyd 1-10 in Section 10, 1-14 and 6-14 in Section 14, 7-15 in Section 15 and 5-16 in Section 16. Wells in the project area will be permitted to operate with no gas-oil ratio restrictions and without lease allowables for 1 year.

The commission acted on testimony presented by Harry P. McClintock, company manager, at a hearing before the commission November 10 last year. McClintock told the commission that Tex-Harvey had studied the results of the Atlantic Refining project and had reached the conclusion that it has been beneficial in increasing oil recovery. The wells in the Tex-Harvey project area at that time were making about 3 to 5 bbl. of oil daily.

Permission for the company to carry out an imbibition project was first granted by the commission late in 1952. Because of the shutdown of the majority of Spraberry wells for excessive gas waste and because of other complications, the experiment was never started.

The so-called imbibition technique is being tried in the Spraberry because the matrix is so tight and so heavily fractured that conventional water and gas-injection operations are not applicable.

Cambrian Search

Trend now has five fields; six new tests are spudded

SAN ANGELO.—Activity is continuing at a high level along the "Cambrian Trend" of Texas' Coke and Nolan counties.

The week's developments included completion of a new discovery, the redrilling of an Ellenburger discovery with Cambrian pay as a new objective, and the start of at least six wells to test the Cambrian.

The Chicago Corp. 1 TXL, which discovered North Dora-Ellenburger field in Nolan County, has been redrilled and will make the third Cambrian producer for the field. Preliminary tests, after deepening to 6,027 ft., flowed 182 bbl. of oil in 2 hours through ¾-in. choke and 150 bbl. of oil in 5 hours through ⅜-in. choke.

Fifth Cambrian pool . . . Neville G. Penrose 1 Kirk, 1 mile east of Blackwell in southern Nolan County, is the latest Cambrian strike for the trend.

When early tests flowed oil the pay section was called Ellenburger, but operators have now identified the section as Wilberns dolomite. Initial potential was 479 bbl. of oil a day through 12/64-in. choke, from 6,268-73 ft. As a Cambrian producer, it marks the fifth area in that pay along this new trend of fields.

Geological studies have identified the Wilberns formation as being directly below the Ellenburger group. The dolomitic facies is a thick section in the upper member of the formation, and

this dolomite production was first identified in American Trading & Production Corp.'s wells in White Flat field.

The upper limit of the Wilberns formation has been shown to coincide with the Cambrian - Ordovician boundary, and in some areas it transgresses the Cambrian - Ordovician boundary. This accounts for the difficulty in properly identifying Ellenburger and Cambrian production in the area of the Penrose strike.

Fisher prospect . . . Texas Crude Co., A. O. Wellman & Sons and James H. Snowden 1 Huddleston, 6 miles south of Sylvester, has cored a saturated dolomite section which the operators believe is in the Wilberns. Sample-top at 5,832 ft. was first picked as Ellenburger, but may check out to be Wilberns. A 16-ft. core recovery between 5,846-62 ft. was saturated with oil and operators prepared to drill-stem test.

Texas Allowables Up

April's 18-day allowables increase production 122,000 bbl. over March and 232,000 bbl. more than April 1953

AUSTIN. — April production allowables in Texas were raised by retaining the 18-day production schedule for the 30-day month compared with the same number of days for 31-day March.

The 18-day schedule applies to the East Texas field as well as to prorated fields generally over the state.

The new calendar day allowable of 3,104,568 bbl. daily represents an increase of 122,152 bbl. daily over the original estimate of allowable for March. Also, the April allowable is 232,716 bbl. daily more than the allowable as of April 4, 1953.

The allowable on April 4 of last year is selected for the comparison since the actual April allowable was less than the original estimate. The Texas Railroad Commission shut in part of Spraberry production after the allowable hearing last April.

One of the accompanying tables shows a comparison of the new allowable by districts with the original estimate for March and with the totals for the first Saturday of April 1953.

The other table gives a picture of the trend in Texas allowables since the first of last year. The table also shows the number of producing days for the state generally and for East Texas field.

Texas allowables were above 3,000,000 bbl. daily for 7 out of the first 9 months of last year, but were below 3,000,000 bbl. daily for the last quarter of 1953 and the first quarter of 1954.

The April allowable, based on 18 producing days, exceeds the allowable for September, based on 19 producing days. Part of the gain has been due to production from new wells and part to the fact that full production in the Spraberry was not resumed until January of this year.

ALLOWABLES BY DISTRICTS

(Barrels per calendar day)

	April 1, 1954	March 1, 1954	April 4, 1953
Dist. 1	50,029	47,902	40,397
Dist. 2	155,484	149,391	152,375
Dist. 3	471,838	455,204	463,527
Dist. 4	274,163	264,624	253,933
Dist. 5	51,768	49,919	49,543
Dist. 6 (outside East Texas)	129,958	125,525	124,439
Dist. 6 (East Texas field)	253,424	245,065	258,059
Dist. 7-B	173,449	164,391	135,121
Dist. 7-C	222,353	212,537	157,894
Dist. 8	950,748	908,450	920,135
Dist. 9	261,142	251,194	222,882
Dist. 10	110,212	108,214	93,547
Total	3,104,568	2,982,416	2,871,852

TEXAS ALLOWABLES—FIRST OF MONTH

(Barrels per calendar day)

	First-of-month allowable	Producing days	
		Statewide	E. Tex.
Jan. 1953	3,211,108	22	19
Feb. 1953	3,238,937	20	17
March 1953	3,118,751	21	18
April 4, 1953	2,871,852	19	18
May 1953	2,894,299	20	18
June 1953	3,019,434	20	18
July 1953	3,103,073	21	18
Aug. 1953	3,146,920	21	18
Sept. 1953	3,005,443	19	18
Oct. 1953	2,904,409	19	18
Nov. 1953	2,803,528	17	17
Dec. 1953	2,756,906	17	17
Jan. 1954	2,824,423	17	17
Feb. 1954	2,830,448	15	15
March 1954	2,982,416	18	18
April 1954	3,104,568	18	18

Oklahoma Stands Pat

OKLAHOMA CITY.—The Oklahoma Corporation Commission last week left the state's April allowable unchanged from March on the per-well allowable basis, marking the fourth month this year in which no change has been made in the allowable.

The commission action means a production of between 515,000 and 530,000 bbl. a day for April. The allowable was based on a formula which has been in use since last October under which the producing rate is set at 60 per cent of last August's per-well allowables. Unallocated and stripper wells have a maximum daily allowable of 30 bbl. per well.

Louisiana Follows Texas

BATON ROUGE, La. — Louisiana oil production allowables for April will be raised with the restoration of an across-the-board 5 per cent cut in allowables which has been in effect since last October.

The April allowable increase will amount to about 19,000 bbl. per day. The March state allowable was 669,845 bbl. per day.

Salt-Dome Order Issued

AUSTIN. — The Texas Railroad Commission has instituted a new policy governing well spacing and permits to drill on piercement-type salt domes.

In the past, the commission has permitted drilling on these domes without regard to spacing regulations. This was a matter of policy and not provided in any rule or order.

The commission has compiled a list of piercement-type salt domes where it allows spacing at will. This is expanded as new domes are proved.

Spindletop thus is classified as a piercement-type dome and an operator may locate his well anywhere. If he should discover a new Yegua sand and ask that it be designated as a new field, the commission will then regard the well as no longer in Spindletop field and this well and all others drilled to the new reservoir must conform to the state-wide spacing rule.

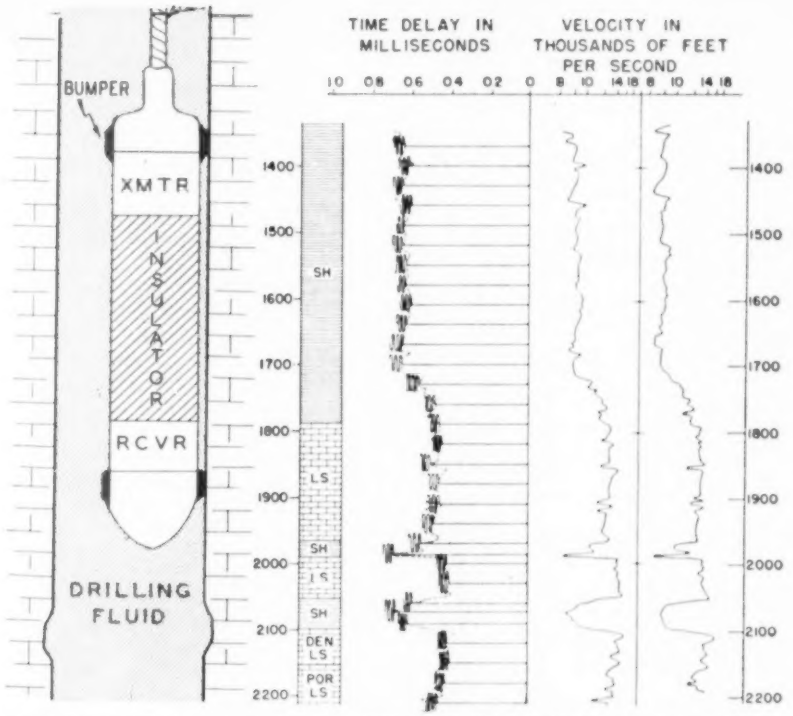
Storage Permit Sought

AUSTIN.—Cosden Petroleum Corp. last week applied for a Texas Railroad Commission permit to store liquefied refinery gases from its 28,000-bbl. Big Spring refinery in an underground cavity.

The company plans to leach out a 50,000-bbl. cavern in a salt section at 975 ft. The stored products would be used in manufacture of aviation gasoline. Facilities for avgas manufacture are now being erected at the refinery.

Salt water would be disposed of in the San Andres formation. Testimony disclosed that there is no San Andres production within 15 to 20 miles of the proposed injection site.

Cosden also asked that it be allowed to expand the storage project in the future without a special hearing.



LOGGING TOOL is a compact instrument carrying both transmitter and receiver.

DIAGRAMMATIC ILLUSTRATION of the variation in time delay to form a composite velocity log, and the comparison of two velocity logs from different wells.

New Exploration Tool

New sonic device makes continuous record of sound-energy velocity, gives better clue to seismic-reflection depths

TULSA.—A new and important tool in exploration—"continuous velocity logging"—is being made available to the oil industry.

The new technique uses a sonic device on a conventional well-logging cable to obtain a continuous record throughout a well bore of the velocity of sound-energy travel through subsurface formations.

Until now it has been possible to make only spot checks in a well, setting a geophone at various depths and exploding at the surface a separate powder charge for each geophone depth setting.

The continuous-logging tool contains both a transmitter and receiver, separated by an insulator, and generates and records pulses at such a rate that it obtains a continuous record.

Magnolia Petroleum Co. invented and developed the method. Seismograph Service Corp. has been licensed to use it on a service basis, and last week the first unit offering the service was operating out of S.S.C.'s Midland, Tex., office.

Why it's important . . . Information on vertical velocity of sound-energy travel has been needed since the beginning of seismic-reflection prospecting.

The seismograph records only the time required for a sound-energy wave to strike a formation and be reflected to the surface. To determine accurately the depth of the formation, the velocity of travel must be known, and the velocity varies in different formations.

In the past, such velocity information has been obtained for hundreds of wells by placing a geophone at different levels in the hole and shooting near the surface. When the geophones are closely spaced, the interval velocities obtained seem to correlate with the lithology of sidewall formations.

This information aids in recognizing zones of marked velocity transition and provides a clue for identifying seismic reflecting surfaces in nearby areas.

How continuous logging works. . . . The sonic device consists of an ultrasonic signal generator which emits pulses at the rate of 20 to 30 per second. The generator is separated from the signal receiver unit by a 5-ft. acoustical insulator. The elements of the sonic device are built into an instrument 3⅜ in. in diameter and 9½ ft. long.

The instrument measures the travel-time of the pulse between the transmitter and the receiver. It plots these times versus depth on a special recorder. Since the formation velocity is nearly always higher than that of the fluid in the hole, the first arrival of energy at the receiver is that which has traveled along the "least time path" of the sidewall formation. Therefore, the recorder plots the interval velocity of the formation between the transmitter and the receiver with respect to depth.

A built-in integrator of the interval velocity provides a function of travel time. These integrated travel times have been found to be accurate within 5 per cent of the travel times obtained by conventional well shooting. At present it is recommended that these travel times be checked at various levels by standard well-shooting techniques. For this purpose a well geophone is built into the logging instrument.

The surface equipment consists of a conventional seismic recording unit for well shooting and the velocity recording panel. An oscilloscope is used for a continuous check of logging accuracy.

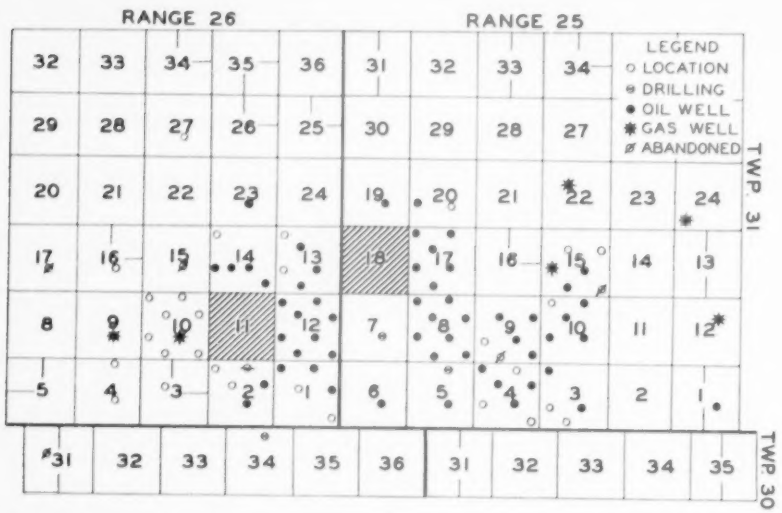
Logging is normally done in open holes at a rate of 100 ft. per minute. This rate means that each 5-ft. section is sampled at least 60 times. Since variations in hole diameter affect the travel-time paths, it is desirable to run a caliper, or section gage survey in each well logged by this service.

Advantages . . . Developers of the velocity-logging technique consider it a versatile and valuable tool for several reasons:

. . . Velocity logs appear to be more dependable in determining horizons and in making depth analysis of seismograms.

. . . They reflect lithology more accurately than previous velocity-determining methods.

. . . They measure the thickness of beds which show marked velocity contrasts with adjacent formations. These contrasts also can be correlated from well to well.



CROSS-HATCHED sections are crown-reserve lands in Smiley field farmed out by Saskatchewan Government to Consumers Cooperative.

Farmout Deal Scored

Saskatchewan's oil industry raps government-cooperative transaction in two crown-reserve leases in Smiley field

REGINA, Sask. — The Government of Saskatchewan is now in the oil business.

In an unprecedented action, the province has farmed out two sections of crown-reserve lease acreage in Smiley field to Consumers Cooperative Refineries, Ltd.

Under the unusual agreement, the cooperative will pay all costs of developing the area, and will receive 85 per cent of the net return after paying normal crown royalty. The remaining 15 per cent will be the government's share.

After all wells are paid out, the government will receive 60 per cent of the net return and the cooperative 40 per cent.

According to the agreement, accounting will be done on a joint-account basis and "parties to this agreement shall each have a share in the wells drilled in the area and the physical structures thereof and all equipment and other material or interests purchased by the company and charged to the joint account."

Sections involved . . . The sections involved are 11-31-26 west of the third meridian, and 18-31-25 west of the third meridian.

In the first, and only other, disposition of crown reserve lease oil acreage in the province, the government followed the Alberta pattern of a sealed bid public auction system. This acreage was in the Fosterton-Success area and drew, in 1953, a total of $2,530,-174 in bonus bids for eight quarter sections from the team of Sohio Petroleum Co. and Union Sulphur & Oil Co., Socony-Vacuum Exploration Co. and Nuco and Associates. Normal royalty is also paid on production.

Industry opposed . . . The Saskatchewan division of the Canadian Petroleum Association has sharply criticized the government for its action, saying its entrance into oil production and development is not in the best interests of either the public or the oil industry.

"The agreement between the government and the Consumers Co-Operative Refineries has denied the established oil companies the right to bid for this land, even though large sums of money have been expended by these companies in this province on oil exploration and development," the CPA said.

Resources Minister Brockelbank stated in the legislature the following day that the contract between the government and the Co-Op was not to be considered a precedent or policy. He went on to explain that it would continue to be the government's policy to consider each case on its merits.

Gas Line Legislation

Single gas gathering firm for all Alberta proposed

EDMONTON, Alta.—Premier Ernest C. Manning has introduced a bill in the Alberta legislature to incorporate one single company for the construction and operation of a natural-gas gathering system for the entire province.

The system was recommended by the petroleum and natural-gas conservation board to supply gas to many communities and collect gas for export. It is almost certain to go through the government-dominated legislature.

The bill would keep control of Alberta gas in Alberta by restricting voting shares in the corporation to the province and providing for two government representatives on the board of directors.

It will not be a crown company, however. Shares will be sold on the public market.

Capital stock of the company would consist of 8,002,002 shares of Class A and Class B common stock with a par value of $5. Only 2,002 shares of Class A stock would have voting rights.

The voting stock would be divided among gas utility companies, gas export companies, gas producers and processors and persons appointed to the board as government representatives.

Passage of the bill would insure that only one trunk line would be operated in Alberta.

Gas Export Hearings Begin

CALGARY, Alta.—Hearings before the Alberta Petroleum and Natural Gas Conservation Board on a new application by Trans-Canada Pipe Lines, Ltd., to export natural gas to eastern Canada and the United States have been started.

The new application, filed after the amalgamation of Trans-Canada and Western Pipe Lines, Ltd. *(The Oil and Gas Journal, January 28, page 56)*, proposes export of 540,000 M.c.f. of natural gas daily for at least 25 years, compared with the original Trans-Canada proposal to export 175,000 M.c.f. daily.

The new application also asks per-

mission to build a 35-in. pipeline, instead of a 24-in. line, from Princess, Alta., to Winnipeg, Man., and to build a 24-in. line south from Winnipeg to Emerson, Man., near the international boundary where it would connect with a United States line.

Discovery Indicated

Saskatchewan well testing new gas-distillate horizon

REGINA.—Canadian Gulf-Canadian Devonian 9 Quinn is an indicated gas-distillate discovery in Saskatchewan of possible great importance to the entire Williston basin.

A test of the Mission Canyon flowed gas at the rate of 6,520 M.c.f. per day with a distillate spray. Another test in the same formation flowed gas at the rate of 10,000 M.c.f. per day with recovery of 20 ft. of light green condensate in the pipe. Still another test flowed 55 bbl. of oil in 30 minutes. Recovery in the pipe was 225 ft. of light green oil, 40.7° gravity.

The significant new prospect is located about 55 miles north of Beaver Lodge-Tioga oil production in North Dakota, and is 18 miles north of the Burke County, North Dakota border. Production at the new discovery is near 4,600 ft., while Beaver Lodge production is in the 8,500-9,000-ft. classification. The indicated discovery is of high importance to the future of drilling between the Nesson anticline of North Dakota and this area of Saskatchewan.

Canadian Gulf and Canadian Devonian hold 13¼ sections of crown land within a 2½-mile radius of the well. Other companies holding freehold acreage within the same radius and varying from 3½ sections to a quarter section include Imperial Oil, Ltd., Sun Oil Co., Union Oil Co. of California teamed with The British American Oil Co., Ltd., Royalite Oil Co., Ltd., Cordillera Petroleums of Canada, Ltd., Gridoil Freehold Leases, Ltd., Shell Oil Co. and Prairie Leaseholds, Ltd.

New Manitoba Tax Readied

WINNIPEG.—Manitoba will levy an oil production tax for the first time in the near future, R. D. Turner, provincial treasurer, told the legislature in his budget message.

Turner said the "producing area tax" will be levied on the actual value of production from individual wells. It will yield about $60,000 the first year, he said.

No details were revealed, pending introduction of the tax measure by C. E. Greenlay, Minister of Mines and Natural Resources, but legislative sources said the tax will be about 3 cents per barrel at current market prices.

Turner said a low rate is anticipated because of the "possible deterrent effect of a stiff scale of taxation upon industry which is, generally speaking, only beginning to reap returns upon very large exploration and development investments."

The new tax coupled with expanding oil activity is expected to boost oil revenue from $40,000 for the fiscal year ending March 31 to about $185,000 for the following year, Turner added.

ALASKA

Alaskan Well Slated

New West Coast firm plans wildcat in Cook Inlet area

LOS ANGELES.—Drilling of a wildcat in the Cook Inlet area of Alaska's southern coast about 150 miles southwest of Anchorage is expected to get under way about midyear.

The well will be drilled by Iniskin Unit Operators, Inc., formed by a group of West Coast individuals and headed by R. E. Havenstrite, Los Angeles independent operator.

A new drilling rig has been shipped from Wichita Falls, Tex., to Seattle and will be barged from there to Cook Inlet along with other necessary equipment for the project. Plans call for the shipment to leave Seattle shortly after April 1.

Iniskin holds a block of 50,000 acres on which the test will be drilled.

The new venture will mark the second such operation by private companies in Alaska. The first was the entry of Phillips Petroleum Co. and Kerr-McGee Oil Industries, Inc., into the Katalla-Yakataga area (shaded area on the map). The Phillips-Kermac operation is already under way.

GULF COAST

Wildcat is Gasser

EDNA, Tex.—A wildcat well rated good for more than 250,000,000 cu. ft. of gas daily on open-flow potential tests has been completed in northeastern Jackson County, on the Texas Gulf Coast.

The well, South Texas Oil & Gas Co. 1 Wearden, had the large flow rate on potential gage of production from Miocene sand at 3,965-68 ft. An additional flow at the rate of 13,900,000 cu. ft. of gas daily was recorded from a shallower sand at 3,741-46½ ft. The gas is dry.

A dual completion has been made, with the lower sand productive through the tubing and the upper sand through the casing annulus.

The discovery is 5 miles north of Cordele. The operating company has 22,000 acres under lease in the general area where it is carrying on a continuous exploratory and development drilling program. Seven gas wells have been completed to date.

McBride Contracts Pemex Oil

SAN ANTONIO. — A $22,000,000 purchase contract for Mexican crude oil has been signed by McBride Oil & Gas Corp. here with Petroleos Mexicanos (Pemex), the Mexican oil agency.

The contract, one of the largest ever executed by a single company with Pemex, is for the purchase of 7,500 bbl. of Mexican crude daily, which will be processed at McBride's Brownsville, Tex., refinery. The purchase will not affect McBride's purchase of South Texas crude, McBride officials said.

The Brownsville refinery, now undergoing an expansion program which will increase its capacity from 7,500 to 20,000 bbl. daily *(The Oil and Gas Journal, November 16, page 418)*, will receive the Mexican oil by tanker at Port Brownsville from the Mexican Gulf Coast.

COMPLETED SYSTEM after 3-year expansion program.

Interstate Modernizes

Company replaces 908 miles of old line with 410 miles of larger pipe, 11 old pump stations with three new ones

Robert J. Enright

SHREVEPORT.—Interstate Oil Pipe Line Co. is now conducting shakedown runs of its new Finney pump station 8 miles south of here—the last unit of a 3-year, $21,700,000 construction and modernization program of the company's southern division crude oil pipeline system.

The program involved laying 410 miles of new lines in North, South and Southwest Louisiana and building three new main line pumping stations. The new lines include 136 miles of 22-in., 32 miles of 20-in., 22 miles of 18-in., 112 miles of 16-in., 94 miles of 12-in., and 14 miles of 8-in. pipe. They will replace 908 miles of old lines ranging in size from 4 to 12-in. The new pump stations, Finney, Bunkie, and New Iberia replace 11 old or temporary stations.

Capacity of the trunk-line systems serving Esso Standard Oil Co.'s Baton Rouge refinery has been expanded from 262,000 bbl. daily to 363,000 bbl. daily. Cost of this new capacity, Interstate figures, is about $210 per barrel. Capacity can be increased an additional 110,000 bbl. daily at a cost of about $5,500,000 or about $50 per barrel on new capacity. The cost figures do not include that of construction of lateral lines and gathering facilities built to increase the crude to the new trunk lines.

Three in one . . . The expansion program was broken down into three major construction operations: (1) Expansion and revision of the company's so-called Southwest Louisiana system southwest of Anchorage, La.; (2) expansion and revision of the South Louisiana system southeast of Anchorage, and (3) expansion and revision of the southern division main line from Anchorage north to Finney station near Shreveport and west to the Louisiana-Texas state line.

Southwest Louisiana system . . . Interstate increased capacity of this system from 38,000 to 80,000 bbl. daily by replacing the existing 6 and 8-in. main line with 12 and 16-in. pipe and building a new pump station at New Iberia—midway between Sunset and Bayou Sale.

Construction was begun in 1951 with the laying of 35 miles of 12-in. south from Sunset to near New Iberia. In 1952, the company laid 29 miles of 12-in. south from New Iberia, 51.6 miles of 16-in. from Sunset east to Anchorage Terminal and started construction of the New Iberia pump station.

Completion of the new Sunset-Anchorage line enabled the company to retire Port Barre Station north of Sunset and to remove pumping equipment, controls, etc., for use at the New Iberia installation.

Krotz Springs and Blanks booster stations on the Sunset-Anchorage line where shut down late in 1952, and the Sunset station replaced by a small injection station early in 1953 when the New Iberia station was completed.

The Southwest system main line now comprises 51.6 miles of 16-in. and 62 miles of 12-in. with New Iberia station the only major pumping unit. Capacity of the system could be further increased to 120,000 bbl. daily by the installation of a new pump stations at Sunset, expanding the New Iberia station and completing the 12-in. line south to Bayou Sale.

South Louisiana system . . . Construction which increased capacity of the South (Raceland) system from 28,000 to 65,000 bbl. daily was kicked off by Interstate in late 1952.

The company replaced the 6 and 8-in. line from Raceland south to La-Rose with 12-in. before the year ended and completed laying 16-in. from Raceland north to Plaquemine in place of the old 8-in. line last summer. A 4-mile, 10-in. section between Plaquemine and Anchorage Terminal was also replaced with 16-in. pipe.

The system now consists of 17 miles of 12-in., 59½ miles of 16-in. and 12 miles of 10-in., and only one major pump station located at Raceland.

Capacity here also can be increased when the need arises to 108,000 bbl. daily by replacing the remaining 12 miles of 10-in. between Plaquemine and Anchorage with 16-in., by laying 12-in.

CREWS BATTLED QUAGMIRE caused by excessive rain during the laying of the section of 20-in. line from Bunkie to Melville, La. Here doping and wrapping machine is hoisted from one section of pipe to another.

to replace the present 6-in. line on the 16½-mile stretch between LaRose and Golden Meadow and by putting a new heavy-duty station at Raceland.

The South system was also extended late in 1952 to serve new production in the Lake Raccourci field. The company laid 7 miles of 12-in. to Golden Meadow south, with a 7-mile, 8-in. lateral branching off to the southwest to LaRose.

Main line project . . . Work was started late in 1951 on the expansion and modernization of the southern division main line from Anchorage north to Finney station.

Construction crews replaced the old multiple 8-in. lines between Bunkie and Melville with 32 miles of 20-in. in 1952, and abandoned the old 2,200-hp. pump stations at these two locations in favor of a new station at Bunkie with three 1,200-hp. dual-fuel engines driving centrifugal pumps. Since then on the Anchorage-Finney stretch all multiple 8-in. lines have been replaced and all but 33 miles of the double 12-in. lines replaced with 22-in. and the new Finney electrical centrifugal station erected.

The company also has retired the double 10-in. lines from Moore station west to the Texas State line and laid a single 18-in. line between Finney station and the Louisiana-Texas state line.

Capacity of this system has been upped to 133,000 bbl. per day. This system takes in 22 miles of 18-in., 136 miles of 22-in., 32 miles of 20-in. and 33 miles of dual 12-in. The only pump stations are at Bunkie and Finney.

Capacity of the system can be boosted, if necessary, to 157,000 bbl. daily by replacing the remaining dual 12-in. lines with 22-in., adding another pumping unit at Bunkie and changing the pump impellers at Finney, together with adding more tankage at both stations.

Interstate's southern division system grew from the company's original 8-in. line laid in 1909 from the Arkansas-Louisiana state line at Baton Rouge.

As the capacity of Esso's Baton Rouge refinery increased and as more oil was discovered in Louisiana, the line was looped and relooped. Additional capacity was added at the pump stations. Later many of the multiple 8-in. lines were replaced with dual 12-in. lines.

The Southwest Louisiana system was laid in 1937 and the South Louisiana system in 1942. Late in 1943 one of Interstate's predecessors (Oklahoma Pipe Line Co.) began operations in Mississippi and during 1945 western Mississippi and northeastern Louisiana were linked to Baton Rouge by a trunkline system.

Interstate boosted its capacity in South and Southwest Louisiana by about 50 per cent by the end of August 1951 by building four temporary booster stations at Labadieville, Plaquemine, Blanks, and Port Barre and installing additional pumping units at five existing stations—all of them of the portable package unit type. The latter were installed at Valentine, Raceland, Belle Rose, Krotz Springs, and Sunset.

On completion of the permanent facilities, all of these units were retired.

Contractors . . . Pipe laying contractors on the Interstate expansion program were: River Construction Co., 22 miles of 18-in., 136 miles of 22-in.; Latex Construction Co. of Georgia, 32 miles of 20-in.; Delta Pipe Line Construction Co., 14 miles of 8-in.; L. E. Farley, Inc., 55 miles of 16-in.; Houston Contracting Co., 51 miles of 12-in., and 52 miles of 16-in.; and J. R. Stewart Contracting Co., 21 miles of 12-in.

River Construction Co. was the overall contractor on the Finney pump station. Bunkie station was constructed by company personnel with the aid of numerous subcontractors.

Little Inch Change

Reconversion to products includes new link for gas

SHREVEPORT.—Texas Eastern Transmission Corp. is going ahead with plans to reconvert the Little Big Inch gas line to products.

The company last week announced it is well along on engineering studies in preparation for filing applications with the Federal Power Commission for new gas-line construction.

George T. Naff, Texas Eastern president, said here that reconversion of the present 20-in. line will not be made until added facilities are built to handle the company's present natural-gas capacity.

Naff said plans for converting the natural-gas system have not been completed in detail but that engineering work is under way.

He estimated a minimum cost of approximately $76,000,000 will be required to reconvert the line to transport oil products and to provide substitute facilities for gas transportation.

The company has been considering reconversion of the Little Big Inch to products service for some time *(The Oil and Gas Journal, February 22, page 113).*

What is planned . . . in its annual report, the company said the new facilities will include approximately 329 miles of new pipeline and adding 84,100 compressor station horsepower at various points on the system.

These preliminary plans include building some 216 miles of 24-in. line from the Castor, La., station to the terminus of the company's 30-in. line at Kosciusko, Miss., and about 113 miles of 16-in. line from Beaumont, Tex., to a point of intersection with the 24-in. Provident City-Castor line near Lufkin, Tex.

These new facilities would shift about 200,000 M.c.f. of gas per day from the 20-in. line to the 30-in. line, increasing the capacity of the latter to

a daily input capacity of approximately 600,000 M.c.f.

Naff said the proposed reconversion is based on the assumption that legal and related matters can be resolved and that the FPC will permit abandonment of natural-gas service through certain portions of the Little Big Inch line and substituting this service with other facilities.

He said studies conducted by Texas Eastern indicate the conversion is feasible as far east as Moundsville, W. Va.

"Based on long-range economic considerations, we believe the reconversion project will prove of material benefit not only to the public and the holders of the company's securities, but also to the nation from the standpoint of national security," Naff said.

Union Aim Clarified

Industry-wide contract is not goal, organizers say

DENVER.—Leaders of a move to organize a single union for oil and chemical industry workers declared last week they are not seeking industry-wide bargaining.

In a "statement of intentions," the temporary ratifying committee of the Oil and Chemical Workers Union said industry-wide contracts would not be "proper or feasible" and are not the union's aim.

The statement, printed in the "International Oil Worker," official publication of the Oil Workers International Union (CIO), said bargaining would be done on a plant basis on some issues and on a company-wide basis on others. O. A. Knight, O.W.I.U. president, is chairman of the temporary committee.

The ratifying committee said it does not "believe that any two companies should be covered by the same contract."

In elaborating on the proposed bargaining policy, the committee said those items of company policy fixed at a plant level should be negotiated at plant level while those determined at "top headquarters of the company" should be negotiated with top management on a company-wide basis.

The committee pointed out that although they agree employes of different companies should work under different contracts that these same employes "should cooperate with one another through a single international union for oil and related industries."

The committee also endorsed the "pattern" device of collective bargaining by which a pattern is set through negotiations with a leading company.

Industry Briefs

LOS ANGELES.—Monterey Oil Co. here has purchased Fullerton Oil Co. for $52,981,500 by exercising an option for the purchase of 741,000 shares of Fullerton stock at $71.50 per share. The consolidation of the two firms was effective immediately. Fullerton owns production in California, Texas, Oklahoma, New Mexico, and Wyoming.

NEW YORK.—The Texas Co. plans to spend more money on new facilities during 1954 than in any previous year. Last year's capital expenditures hit a record high of $230 million, compared to $225 million in 1952. New records also were set in 1953 by all of the firm's departments.

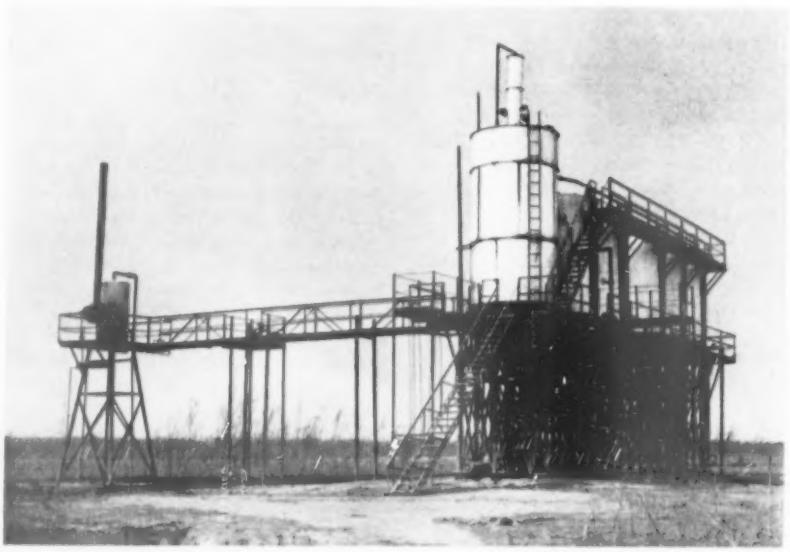
OIL CITY Pa.—Operations were resumed early last week at Pennzoil Co.'s refinery near here after a wildcat strike forced a one-week shutdown. Members of the Oil City local, No. 455, Oil Workers International, CIO, walked out March 8 when the firm dismissed an employe reported to be found smoking within the plant area.

REGINA, Sask.—Sealed bids on 10 separate parcels of provincially owned oil and natural-gas leases in the Midale, Dollard, Forget, and St. Florence areas will be received by the Department of Mineral Resources until April 23. Land offered at the sale, first to be held this year, includes two sections in D'Arcy field, one section in St. Florence area, a quarter section in Dollard field, four quarter sections in Midale field, and two quarter sections in Forget field.

CASPER, Wyo.—A complete listing and revision of Wyoming field names has been submitted to the state mineral supervisor by the state field names advisory committee. Final submission with any further suggested changes will be made by April 1.

LOS ANGELES—The City Council of Redondo Beach has granted zone variances to permit drilling on tracts of Redondo Improvement Co. in the eastern part of the city. The area is on the northwest edge of Torrance field, outside of the city areas in which oil drilling is prohibited by an initiative ordinance adopted in 1935.

PITTSBURGH. — Gulf Oil Corp.'s provisional capital budget for 1954 calls for expenditures of about $250 million, an all-time high for the company. Capital expenditures during 1953 for plants, properties, equipment and related assets were $221,598,000, compared with $192,688,000 for the prior year.



Tank Battery "Stilts" Beat Spring Floods

Nature's annual spring rampage in the form of floods along the Ohio River presents a lot of recurrent problems to operators with production in the area. Sun Oil Co. solved the problem on its Nancy Biggs lease in Uniontown field, Kentucky, by elevating its tank batteries and other production facilities on 20-ft. substructures. When the Ohio floods the area—and the season is due soon—Sun pumpers and gagers carry out their chores in power boats.

Crude Output Dips

California production decreases for first time in 3 years; cut in drilling activities, excess of heavy fuel cause decline

D. H. Stormont

LOS ANGELES. — California crude oil production is trending downward after more than 3 years of almost constant increases, during which daily average output rose from 860,000 to the all-time peak of 1,011,000 bbl.

Current production is estimated at approximately 990,000 bbl., or about 21,000 bbl. below the peak established last June. Most of the decline has been in the past 4 months. Output last November averaged 1,006,000 bbl. daily.

About half of the drop can be traced to natural decline resulting from slackened development drilling. The remainder, about 10,000 bbl., is because of more than 1,000 heavy-oil producing wells being shut in. The latter action has been taken to offset excessive and constantly increasing inventories of heavy fuels.

About 6,000 bbl. of low-gravity production was shut in earlier this month by Standard Oil Co. of California. Several hundred wells were closed at fee-owned properties in the Coalinga, South Belridge, McKittrick, Lost Hills, Midway-Sunset, and Kern River fields in San Joaquin Valley. Other wells shut in were in the Cat Canyon, Placerita, Whittier, and Montebello fields of southern California.

Tide Water Associated Oil Co. last fall found it necessary to take similar action. It reduced supply by 4,000 bbl. daily through shutting in approximately 600 wells in the Kern River field, all on fee-owned properties.

Oversupply of resid . . . The recent trend, according to American Petroleum Institute figures, has been for the supply of residuals to continue to outstrip demand. Stocks in District 5 on March 13 were estimated to be 21,400,000 bbl., about 5,500,000 bbl. above those at the same time in 1953. Inventories of residuals held as cracking stocks were placed at 18,000,000 bbl., more than twice the 8,500,000 bbl. held on March 7, 1953.

In announcing closing in of the low-gravity wells, Standard's president, T. S. Petersen, said the action was brought about in considerable part by the importation of natural gas from Texas. These movements, he stated, have been estimated to be roughly equivalent to 125,000 bbl. of petroleum per day, "much of which would come from heavy crude oil."

He added that all of the company's refinery facilities for processing the residuals into lighter products are now being used to full capacity, and "we won't be able to handle additional quantities until specialized new facilities, now being built, are completed late this year."

Increase use . . . To offset the excessive supply of residual fuels and low-gravity crudes, he declared Standard is increasing the use of these fuels for heat and power purposes at its refineries by another 6,000 bbl. daily.

Another step being taken is a reduction in imports of foreign crude. This month and during the second quarter, California Standard's imports will be kept 10,000 to 12,000 bbl. below the January-February level. The import rate of 23,000 bbl. daily will be about 35,000 bbl. below the level maintained during the second quarter of last year, he said.

Wildcat Spoils Legend

LOS ANGELES.—A wildcat drilled by The Texas Co. 5 miles north of San Clemente has toppled, at least temporarily, a long-standing saying that no oil will be found south of the Santa Ana River.

Texaco's wildcat, 1 O'Neill Estate is about 20 miles below the Santa Ana. Last week it was completed flowing 19 bbl. of 46°-gravity crude in 48 hours. The new discovery may prove to be noncommercial but it did open a new province for exploration.

The oil flow was through a 12/64-in. choke, with production coming through perforations at intervals between 3,918-4,185 ft. The wildcat has been plugged back from 7,044 ft.

Nevada Activity to Increase

ELY, Nev.—Shell Oil Co. has announced it plans to move in two more drilling rigs into the Eagle Springs area southwest of here where it has an apparent discovery of oil.

The apparent discovery well, Shell's 1 Unit, is coring below 7,438 ft. The well is believed likely to become Nevada's first commercial producer.

To the northeast of Shell's test, Gulf Oil Corp. is shut down at 7,207 ft. in its 1 Wilkins Ranch, NE NE NE 21-38n-61e, near Elko in Elko County, and is moving in a heavier rig.

Combine Studies Deep Offshore Drilling

LOS ANGELES.—Looking forward to the day when new offshore leases will be granted, four West Coast companies have joined to investigate methods for drilling in waters several hundred feet deep.

The companies, Shell Oil Co., Union Oil Co., Continental Oil Co., and Superior Oil Co. several times in the past few years have worked as a group in exploring oil possibilities offshore of southern California. R. F. Bauer, offshore drilling superintendent for Union, has been appointed representative for the combine in the new studies.

One step taken by the group has been to award contract to Macco Corp. and Stone & Webster Engineering Corp. for the design and construction of an offshore drilling platform. Details of the type structure to be employed are not available but it is believed the platform will be capable of drilling in 250 ft. of water, and will be able to withstand wind and wave conditions encountered in the open Pacific Ocean.

It is expected that other potential methods of developing California's offshore reserves also will be investigated by the study group headed by Bauer.

Lloyd Corp. Finds Deep Pay

LOS ANGELES.—Lloyd Corp., Ltd., has established high-gravity, flowing oil production at Oxnard field in Ventura County about ½ mile northeast of the 6,300-ft. McInnis-Sespe pool opened last summer.

The 1 Livingston is producing from the Sespe (Oligocene) at a depth 3,000 ft. deeper than the nearby McInnis pool. Gravity of the crude is 32.1° compared with 22° for that of the shallower McInnis-Sespe pool nearby.

Initial production of the new dis-

covery is 600 bbl. daily. The crude is reportedly of a type quite different from that being produced by Ventura Avenue and other nearby fields, and appears to have a high lubricating oil content.

The test was the operator's first in rather extensive holdings in the vicinity of Oxnard. Aside from the 10,570-ft. Standard of California 1 Lucas, about 2½ miles southwest, it is the first test to drill below 10,000 ft. Relatively little is known about the complicated, faulted deep structure.

MEETINGS

CENTRAL PLANNING COMMITTEE for the annual meeting of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists and the Society of Economic Paleontologists and Mineralogists discuss the St. Louis convention, April 12-15. Seated, left to right, are Noel H. Stearn, St. Louis, W. C. McBride, Inc., convention vice chairman; Graham B. Moody, San Francisco, Standard Oil Co. of California, convention chairman, and Norman S. Hinchey, St. Louis, Washington University geology department, S.E.P.M. convention vice chairman. Standing are Stanley W. Wilcox, Tulsa, Seismograph Service Corp., publicity chairman, and Karl Dyk, Tulsa, Stanolind Oil & Gas Co., S.E.G. vice chairman. More than 4,000 are expected to attend the 4-day joint meeting.

Exploration Meeting Set

4,000 technologists expected for joint annual meeting of A. A. P. G., S.E.G., S.E.P.M. in St. Louis April 12-15

ST. LOUIS.—More than 4,000 exploration technologists from the United States and foreign countries will meet here April 12-15 for the annual joint convention of the American Association of Petroleum Geologists, the Society of Economic Paleontologists and Mineralogists, and the Society of Exploration Geophysicists.

Headquarters will be set up in the Jefferson Hotel and all meetings will be held in Kiel Auditorium, which houses the Opera House and Assembly Hall, where most technical sessions will be held, and Convention Hall where commercial and scientific exhibits will be displayed.

Speakers from the three exploration groups will deliver a total of 109 technical papers at the meeting. Papers of particular interest to the oil industry will include:

Tuesday, April 13 . . . "Sespe Formation of the Santa Barbara Embayment, California," by Robert H. Paschall; "Occurrence of Oil in Non-marine Beds in the San Joaquin Valley," John H. Beach and Victor Church; "Production from Non-marine Beds in The Appalachian Belt," O. L. Haught; "Occurrence of Oil and Gas and Its Relation to Possible Source Beds in the Continental Tertiary of the Intermountain Area," Wayne M. Felts; "Oil Production from the Upper Tertiary Fresh-Water Deposits of West Pakistan," E. S. Pinfold; "The Source Bed Problem in the Valesquez Field, Colombia," W. S. Olson; "Origin of Hydrocarbons in the Uinta Basin," John M. Hunt, Francis Stewart and Parke A. Dickey.

Tuesday evening . . . Panel discussion of oil and gas in continental beds, Gordon Rittenhouse and Marcus A. Hanna, moderator and assistant moderator.

Wednesday, April 14 . . . "Significant Exploratory Development of 1953," Philip C. Ingalls; "Introduction to the Oil and Gas Geology of The Great Plains Region," Theo. A. Link; "Geologic Framework of the Gulf Coastal Plain of Texas," J. W. Waters, P. W. McFarland and J. W. Lea; "The Present State of Geothermal Investigations," Francis Birch; "A Seismic Reflection Quality Map of North America," Paul L. Lyons; "Thickness Maps as Criteria for Regional Structural Movements," Wallace Lee; "Oil and Gas Production from Non-reef Carbonate Reservoirs," Frank B. Conselman.

Wednesday afternoon . . . Symposium on Inclined Oil-Water Tables, M. King Hubbert; "Rocky Mountain Region," Gilman A. Hill; "The Mid-Continent," William L. Russell; "Bradford, Pa.," Charles R. Fettke; "California," Martin Van Couvering; "Canada," Leslie M. Clark.

Thursday, April 15 . . . "Structural and Stratigraphic History of Northern Great Plains," Williard D. Pye and W. Taylor Thom; "Paleozoic Unconformities in the Williston Basin," W. S. McCabe; "Evidence of Older Structural Development in the Williston Basin," K. R. Parsons; "Carboniferous Formations and Faunas of Central Montana," W. H. Easton; "Correlations in the Madison Formation by Insoluble Residues," George Stocker.

"Reef Distribution in the Woodbend Formation of Alberta," John A. Downing and D. Y. Cooke; "Lyons Sandstone in the Denver Basin," Warren O. Thompson; "Age of Wyoming Tectonic Movements," J. D. Love; "South Glenrock, a Wyoming Stratigraphic Oil Field," W. H. Curry.

"The Application of Electric Logging to a Minerals Exploration Program," G. V. Keller; "A Nuclear Magnetometer; "Geophyhical Investigations in the Mojave Desert Area of California," Don R. Mabey; "A New Electromagnetic Field Technique."

SEG speakers will present 75 technical papers and the S.E.P.M. program will include 33 papers on mineralogy and sedimentary petrology; a symposium of Faunal Facies and their lithologic associations; a symposium on regional aspects of carbonate deposition and discussions on general paleontology and stratigraphy.

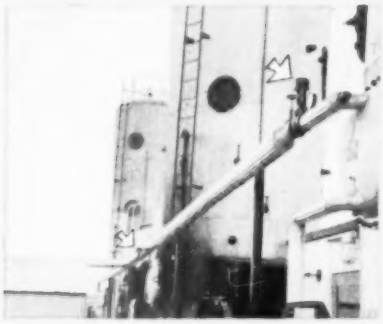
Oil-Lift Course Planned

LUBBOCK, Tex.—Papers on 20 different subjects connected with oil-lift operations will be presented during the West Texas Short Course on Oil Lifting Methods to be held at Texas Technological College here April 22-23.

The course is being offered primarily as a service to oil and gas company production superintendents and foremen through the joint effort of Texas Tech and the oil industry.

Papers will cover such subjects as rod pumping, gas lift, plunger lift; selection and operation of rod pumps; diagnosis of pumping troubles; problems of dual-zone completions; and safety practices on electrified leases.

Also planned for discussion is care, maintenance and operation of rod pumps, and beam units; handling of sucker rods, tubing, long-string hydraulic units; use of inhibitors in corrosion control; proper use of chemicals for breaking emulsions; deep-well lifting problems; and new developments in rod pumping.



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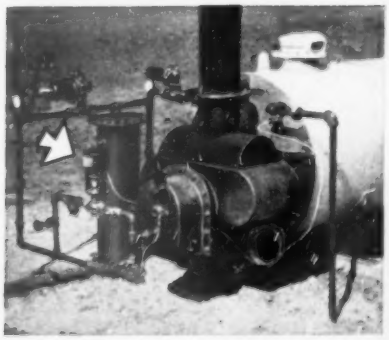

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Import Estimates Drop

Importing companies reporting to Railroad Commission reduce estimates for second quarter nearly 2 per cent

ESTIMATES of crude and product imports for the second quarter have been reduced 1.7 per cent by companies reporting to the Texas Railroad Commission.

The 16 major importing companies filed reports with the Texas Railroad Commission in February indicating an average for the second quarter of 964,700 bbl. daily. By the time the March reports were compiled, the second quarter estimate had been cut to 948,200 bbl. daily or a reduction of 1.7 per cent.

Most of the revision was in crude imports. However, the cut was not enough to prevent an over-all increase in crude imports over the first quarter. On the other hand, the seasonal decrease in imports of heavy fuel will more than offset the small increase for crude to give a net decrease in total imports.

Crude and product imports by the 16 reporting companies averaged 1,091,700 bbl. daily in February compared with 962,900 bbl. daily in February 1953. The increase in product imports accounted for 84,000 bbl .daily out of a total gain of 128,000 bbl. daily.

Comparisons of data for past months indicate that the totals reported to the Texas Railroad Commission represent between 90 and 95 per cent of total imports compiled by the Census Bureau of the Department of Commerce. Most of the difference is accounted for by commercial imports of residual fuel. Crude imports by the 16 reporting companies have averaged about 98 per cent of the Census Bureau total.

IMPORTS*
(Thousands of barrels daily)

	Actual		Estimated or forecast				
	Feb. 1953	Feb. 1954	March 1954	April 1954	May 1954	June 1954	July 1954
Crude—East Coast:							
The Atlantic Refining Co.	55.8	52.7	65.8	65.8	65.8	65.8	65.8
Cities Service Co.	5.4	5.3	8.1	5.7	3.2	9.0	10.3
Eastern States Pet. Co.	7.0	4.5	7.5				1.5
Gulf Oil Corp.	82.0	103.0	104.0	116.0	111.0	115.0	121.0
Phillips Petroleum Co.	7.1	7.0	6.4	6.6	6.5	6.6	6.5
Sinclair Oil Corp.	57.0	58.8	66.0	66.0	66.0	66.0	66.0
Socony-Vacuum Oil Co.	80.7	87.9	89.0	89.0	89.0	89.0	89.0
Standard Oil Co. of Calif.	89.8	58.0	74.0	74.0	74.0	74.0	74.0
Standard Oil Co. (Ind.)	10.7	18.4	13.1	14.1	16.8	13.0	15.0
Standard Oil Co. (N.J.)†	103.0	78.0	81.0	81.0	81.0	81.0	81.0
Sun Oil Co.	15.2	16.1	7.3	7.5	14.5	15.0	7.2
The Texas Co.	50.6	48.5	51.9	40.5	53.0	53.0	53.0
Total East Coast	564.3	538.2	574.1	566.2	580.8	587.4	590.3
Crude—West Coast:							
Standard Oil Co. of Calif.	‖	40.7	22.0	22.0	22.0	22.0	22.0
Tide Water Associated Oil Co.	‖	17.8	19.3	12.9	15.8	12.5	12.2
The Texas Co.	‖	12.4	5.5	4.5	21.2	15.0	20.0
Total West Coast	‖	70.9	46.8	39.4	59.0	49.5	54.2
Total United States	564.3	609.1	620.9	605.6	639.8	636.9	644.5
Products:							
Asiatic Petroleum Corp.	7.8	1.2	6.2	7.7	5.8	8.0	7.0
Eastern States Pet. Co.	8.0	24.4	22.0	22.0	22.0	22.0	22.0
Gulf Oil Corp.	14.0	12.0	11.0	4.0	14.0	10.0	9.0
Shell Caribbean Pet. Co.‡	155.0	170.0	120.0	105.0	80.0	80.0	70.0
Shell Oil Co.	19.3	26.8	22.2	17.9	20.3	21.0	17.0
Socony-Vacuum Oil Co.	7.3		8.0	9.5	9.5	9.5	9.5
Standard Oil Co. (Ind.)§	43.0	28.3	12.1	16.7	18.2	15.4	14.9
Standard Oil Co. (N.J.)†	126.0	209.0	196.0	141.0	141.0	141.0	123.0
The Texas Co.	18.2	10.9	3.4	3.5	8.4	8.5	8.4
Total products	398.6	482.6	400.9	327.3	319.2	315.4	280.8
Total crude and products	962.9	1,091.7	1,021.8	932.9	959.0	952.3	925.3
Bonded oil included¶	15.1	47.6	60.2	64.5	60.6	62.8	61.8

*From company reports to the Texas Railroad Commission. †Based on quarterly estimates. ‡Imported by independent distributors. §Received through suppliers who can furnish either domestic or foreign oil. ¶Mostly duty free for bunkering ships in foreign trade. ‖Included with East Coast.

Imports Decrease

January imports, exports both fall below last year

BOTH imports and exports decreased in January, according to data collected by the Census Bureau of the Department of Commerce.

Total imports averaged 1,094,000 bbl. daily in January for a decrease of 61,000 bbl. daily from the December average. Imports were less than in January 1953 but by the smaller difference of 29,000 bbl. daily.

Under the influence of winter demands for residual fuel, imports of this product continued at a level that was above the average for last year but under the average for the month of January 1953. Residual imports averaged 489,900 bbl. daily compared with 486,900 bbl. daily in December and with the all-time high of 538,100 bbl. daily in December 1952.

Imports of other products decreased slightly from December but were up from January of last year. These products averaged 25,700 bbl. daily in Jan-

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

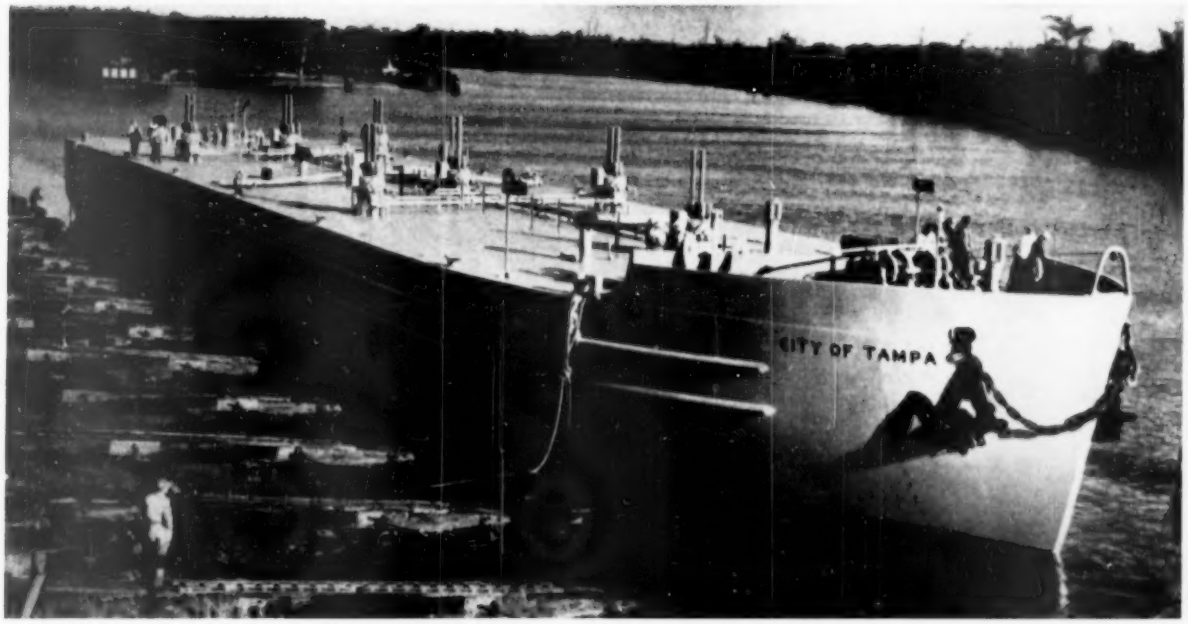
	Jan. 1954	Dec. 1953	Jan.+ 1953
Crude—			
Mexico	373	280	509
Colombia	1,282	1,100	1,350
Venezuela	9,456	10,405	9,543
Kuwait	3,125	3,232	2,708
Saudi Arabia	1,946	2,960	3,247
Iraq	202		186
Qatar	178	214	
Canada	232	305	143
Far East	1,138	1,346	789
Total crude	17,932	19,842	18,475
Daily average	578	640	596
Products—			
Residual fuel	15,188	15,093	15,706
Other products	797	855	624
Total products	15,985	15,948	16,330
Daily average	516	515	572
Total all oils	33,917	35,790	34,805
Daily average	1,094	1,155	1,123

EXPORTS*

	Jan. 1954	Dec. 1953	Jan. 1953
Crude	1,588	1,378	2,211
Gasoline	2,074	2,401	2,645
Kerosine	418	623	332
Distillate	1,616	2,337	2,117
Residual	1,355	1,514	1,367
Lube oils	969	1,261	902
Other products	668	988	919
Total all oils	8,688	10,502	10,493
Daily average	280	339	338

*Excludes shipments to territories. +Revised.

Bethlehem at Beaumont



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uary compared with an average of 28,400 bbl. daily for all of 1953.

Crude . . . Crude imports in January averaged 578,000 bbl. daily compared with 640,000 bbl. daily in December and with an average of a little more than 640,000 bbl. daily for the entire year 1953.

The largest drop from December to January was in receipts from Saudi Arabia. Crude from this country averaged 62,800 bbl. daily in January compared with 95,500 bbl. daily in December and with about 101,000 bbl. daily for all of 1953. Imports from Mexico, Colombia, Iraq, and Canada were slightly higher in January than in December.

Exports . . . Exports of crude and products, excluding shipments to territories, averaged 280,300 bbl. daily in January, the lowest point since January 1951 when the average was 226,000 bbl. daily. The only important increase over December was reported for crude which averaged 51,200 bbl. daily in January compared with 44,500 in December.

The largest decrease from December was for distillate fuels, off 23,300 bbl. daily to 52,100 bbl. daily in January.

Inventories Slide

Secondary stock decline tops one million barrels

WASHINGTON.—Secondary inventories of major petroleum fuels declined 1,156,000 bbl. during January, from 51,107,000 to 49,951,000 bbl., despite a seasonal increase in gasoline stocks of slightly more than 1,000,000 bbl., the Census Bureau announced last week.

In the same month last year total stocks in the hands of jobbers and refiner-marketers increased 1,543,000 bbl., with gasoline showing an increase of 1,474,000 bbl.

Inventories at the close of January 1953 were roughly 3,100,000 bbl. above those of the same date a year earlier, but stocks at the close of January 1954 were 3,400,000 bbl. less than last year, bureau figures disclosed.

With colder weather than a year ago, distillate stocks dropped 1,812,000 bbl., or 9 per cent in January. In 1953 they increased 180,000 bbl. Kerosine stocks dropped 303,000 bbl., against a drop of 152,000 bbl. last year, and residual fuel stocks fell off 50,000 bbl. compared with an increase of 41,000 bbl. a year ago.

A new survey of storage capacity in Districts 1, 2, 3, and 4 placed the total at 84,934,000 bbl. on January 31, compared with 85,240,000 bbl. October 31 and 84,150,000 bbl. January 31, 1953.

SECONDARY STOCKS
(Thousands of barrels)

	Jan. 31, 1954	Dec. 31, 1953	Jan. 31, 1953
Gasoline:			
PAD 1	5,241	5,028	5,788
PAD 2	8,372	7,990	8,867
PAD 3	2,666	2,441	2,502
PAD 4	1,042	924	902
PAD 5	2,137	2,066	2,137
Total U. S.	19,458	18,449	20,196
Kerosine:			
PAD 1	2,781	2,966	2,854
PAD 2	3,294	3,424	3,320
PAD 3	598	587	671
PAD 4	100	89	99
PAD 5	91	101	101
Total U. S.	6,864	7,167	7,045
Distillate:			
PAD 1	9,123	10,534	10,540
PAD 2	5,805	6,211	6,432
PAD 3	663	770	878
PAD 4	497	479	523
PAD 5	1,254	1,160	1,112
Total U. S.	17,342	19,154	19,485
Residual:			
PAD 1	4,731	4,224	4,595
PAD 2	1,255	1,606	1,639
PAD 3	200	338	234
PAD 4	6	5	6
PAD 5	95	164	200
Total U. S.	6,287	6,337	6,674
Four products:			
PAD 1	21,876	22,752	23,777
PAD 2	18,726	19,231	20,258
PAD 3	4,127	4,136	4,285
PAD 4	1,645	1,497	1,530
PAD 5	3,577	3,491	3,550
Total U. S.	49,951	51,107	53,400

ROCKY MOUNTAIN

Court Cases Set

10 companies hold land slated for condemnation

BISMARCK, N. D.—Ten oil companies are defendants in suits involving condemnation of 30,531 acres of land which will be flooded by Garrison Dam being built on the Missouri River.

The cases are on the calendar of the U. S. District Court term which opened here March 22, but most of the landowners' suits have been settled. By agreement, all oil company lease and mineral interests were continued to be heard at one time.

Defendants are Socony-Vacuum Oil Co., Amerada Petroleum Corp., Skelly Oil Co., Phillips Petroleum Co., Hunt Oil Co., The Texas Co., Cardinal Oil Co. of Bismarck, Stanolind Oil & Gas Co., Gulf Oil Corp., and Warren Petroleum Corp.

The land is in Mountrail, McLean, McKinzie, Williams, Dunn, and Mercer counties.

Whether any of the companies will contest the cases is doubtful.

"I suspect most of the companies will accept whatever figure in damages the Government offers them," said an attorney whose firm represents several companies.

Issues involved . . . The issue is whether the Government will be causing damage to the oil companies by inundating land they have under lease. The companies must show that the leases have value before they can recover any damages. Such proof would probably include seismic records and other data which most companies like to keep confidential.

The companies also must show the difference in drilling costs over water compared to dry land. Because the factors involved are so speculative and difficult to prove, the majority of the companies may not consider it worth court action and may attempt to settle by negotiation.

"It would be different if producing acreage were involved, but I understand only one well is in production, Amerada's No. 1 Ytterdahl in McKenzie County," the attorney said.

The Ytterdahl tanks and separator are located on ground higher than the pool level, he said. When the reservoir is full, only the well's christmas tree and tubing will have to be raised about the water, he added.

Montana Officials Resign

GREAT FALLS, Mont.—Montana's relatively new Oil and Gas Conservation Commission last week was out of action.

Three resignations, including the director, attorney, and chairman, left the 7-month-old commission crippled and forced cancellation of a series of scheduled hearings.

Commission Attorney John R. Marchi tendered his resignation 3 weeks ago; a week later Director Alec Crowell resigned, effective September 1 "or sooner." Last week Chairman Ken Byerly submitted his resignation to Gov. Hugo Aronson, effective after a hearing called by Aronson into a stormy dispute over the commission's policies and activities.

Byerly's resignation followed the announcement by Atty. Gen. Arnold H. Olsen that his office is investigating the

Whatever Your Requirements...

This BS&B Installation near Gladewater, Texas, is an example of how large volume treating requirements may be handled. It consists of a BS&B Special Free Water Knockout and a BS&B Special HGT 1028 Horizontal Treater, with a capacity of 30,000 bbls./day. Standard sizes of the HGT will meet capacity requirements ranging from 100 to 4800 bbls./day.

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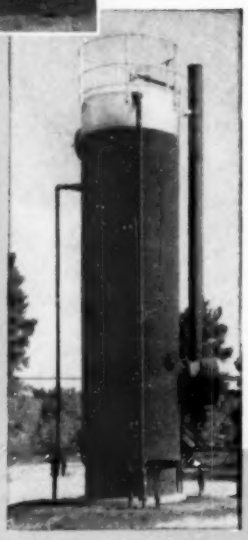
But *no matter what* your treater requirements ... BS&B has a treater that will meet them *perfectly*, and which will give years of efficient and trouble-free service. "Down time" for maintenance or repairs will be *considerably less* than for most other makes of treaters.

If you haven't enjoyed the satisfaction of operating a BS&B Emulsion Treater on your lease, we'd suggest you get the facts from your BS&B Man. Or, write for catalogs and information. There's no obligation!

This BS&B Type "J" Vertical Treater installation is typical of many that are handling particularly tough treating problems throughout the oil country. Depending on treater size, the Type "J" will meet capacity requirements of from 100 to 3600 bbls./day. Type "JCW" is similar to the Type "J", except that it has several additional features which fit it for operation in extremely cold climates.



For low cost treating under average conditions, BS&B Type "S" Vertical Treaters like this one perform excellently. It has a capacity range of from 100 to 2500 bbls./day, depending on the size of the treater. The Type "SCW" is structurally the same as the Type "S", except for modifications to adapt it to cold weather operation.

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commission. During the past several weeks the commission has been the target of many charges of scandal and "favoritism."

The commission was appointed early last autumn and held its first hearing, to adopt a set of conservation regulations and rules of procedure, on September 22.

Line Plans Revised

North Dakota commission considers gas line changes

BISMARCK, N. D.—Public Service Commission will resume its hearings this week on the application of North Dakota Natural Gas Transmission Co. for a certificate of convenience and necessity for the company's amended pipeline plan.

Jay A. Andersen, North Dakota Natural president, told the commission last week changes of plans were necessary to deliver "firm" gas to Fargo. North Dakota Natural first planned only interruptible sales to power plants, but Northern States Power Co. asked for firm gas as a condition of off-peak purchases.

The new plan calls for 100 miles of 12-in. pipe from Tioga to Velva, 66 miles of 10-in. from Velva to Fessenden, 70 miles of 10-in. from Velva to Jamestown, 34 miles of 10-in. from Jamestown to Valley City, and 58 miles of 8-in. to Fargo. From Fessenden 126 miles of 8-in. would be built to Grand Forks, with a 3-in. feeder from Tokio to Devils Lake.

The original plan was 12-in. from Tioga to Minot, with 10-in. from Minot to Fessenden and Grand Forks, 6-in. to Devils Lake and 8-in. from Fessenden to Jamestown, with 6-in. to Fargo.

Joe E. Ross, of Ford, Bacon & Davis, told the commission a resurvey showed anticipated demand had been estimated too high and that elimination of proposed service to New Rockford would allow peak delivery of 10,580 M.c.f. daily to Fargo. North Dakota Natural has a contract with Amerada Petroleum Corp. for 30,000 M.c.f. daily, starting November 1.

Gas price reduced . . . Amerada has reduced its gas price for the first 3 years, Andersen said. Originally Amerada's contract called for 16 cents per M.c.f. with 1-cent increase every 5 years. The new price schedule starts at 13 cents for the first year, 14 cents the second, 15 the third and 16 cents from 1957-59. The price goes to 17 cents in 1959, 18 cents in 1964, and 19 cents in 1969, with the contract expiring in 1974.

Kevin J. Forderbrugen, North Dakota Natural manager, said power plant off-peak gas was being offered at 28 cents per M.c.f. to all points except Minot, where the rate is 21 cents. Several power plant managers said the gas rate would not make conversion of all lignite coal-burning boilers economic, and that the availability of electric power from the Garrison dam project would cut into the third year use of gas and lignite.

The revised plan estimates third-year firm gas sales at 3,172,317 M.c.f. and interruptible gas at 6,582,140 M.c.f. Proposed power plant markets are at Grand Forks, Fargo, Minot, Devils Lake, Jamestown, and the Armour & Co. packing plant at West Fargo.

No change was made in the demand charge of $2.30 or the commodity charge, 28½ cents, both per M.c.f.

Ross said elimination of a feeder line to New Rockford and a compressor station originally contemplated near Fessenden would cut cost of the line from $10,800,000 to $10,700,000.

Amerada Completes Well

BISMARCK, N. D.—Amerada Petroleum Corp. has completed 1 Cheadle in Fryburg field, Billings County, North Dakota with production from the Heath sandstone, a new pay for the Williston basin portion of the state.

The well was finaled for a swab gage of 97 bbl. of oil per day. The test was drilled to the Madison, the field's producing zone, but was plugged back to the Heath, a member of the Big Snowy Group (Mississippian). The well was shut in following the swab gage. The 1 Cheadle is the new field's fourth well, and the third to have Heath possibilities.

Big Producer Completed

SWEETGRASS, Mont.—A Moulton (Lower Cretaceous) sand oil well which flowed at the rate of 3,984 bbl. of 40°-gravity oil per day in a 30-minute swab test from a depth of 2,652 ft. has been completed in the Border-Cut Bank area of Montana.

The big well was announced by Ponder Oils, Ltd., an independent Calgary oil company. The well, Pattie Stewart 2 State, is located in NW NE NE¼ 7-37n-4w, on a 400-acre state lease owned jointly by Ponder Oils, Inc., wholly owned Ponder subsidiary in the United States, and Pattie & Stewart, Montana oil operators. The strike is located a mile south of the international border and 9 miles west of Sweetgrass.

NATIONAL AFFAIRS

Jet Fuel Need Cited

Military demand up 83 per cent for next year

WASHINGTON. — Defense officials last week alerted the oil industry to a big increase in military requirements for aviation fuels—particularly jet fuels—during the fiscal year which begins July 1.

Addressing the first 1954 meeting of the National Petroleum Council, Col. Douglas R. Brown, director of the Armed Services Petroleum Purchasing Agency, disclosed the major increase will be in jet fuels. This demand will jump 83 per cent, he said.

ASPPA is preparing to contract for more than 39,000,000 bbl. of jet fuels for delivery during the first 9 months of the coming year and will buy approximately 20,000,000 bbl. of aviation gasoline for delivery during the first 6 months of the year.

Projected expansion of air strength, world conditions, and the increased production of jet planes were cited by Col. Brown as the factors causing the big increase in the demand for jet-fuel requirements during fiscal 1955.

Anticipated requirements now are set at 83,000,000 bbl. as compared to an expected use of 47,000,000 bbl. during the current fiscal year.

There will be only a slight increase in requirements of aviation gasoline, Brown said. It will be chiefly felt in Grade 115/145, which will mean a greater demand for alkylate.

The needs for other types of fuel will be less than during the current year, but the increased demand for jet fuels will push the over-all military products requirements about 10 per cent above last year's need.

Cuba Woos Oil Industry

WASHINGTON.—The Cuban Government is "willing and ready" to match funds with any foreign oil company willing to drill in Cuba, the Department of Commerce was advised last week.

The announcement of Cuba's hope for oil development was made in a recent speech by Dr. Amadeo Lopez Castro, minister without portfolio and adviser to President Batista on economic matters.

Discovery of oil in commercial quantities could salvage Cuba from its present economic problems, caused by

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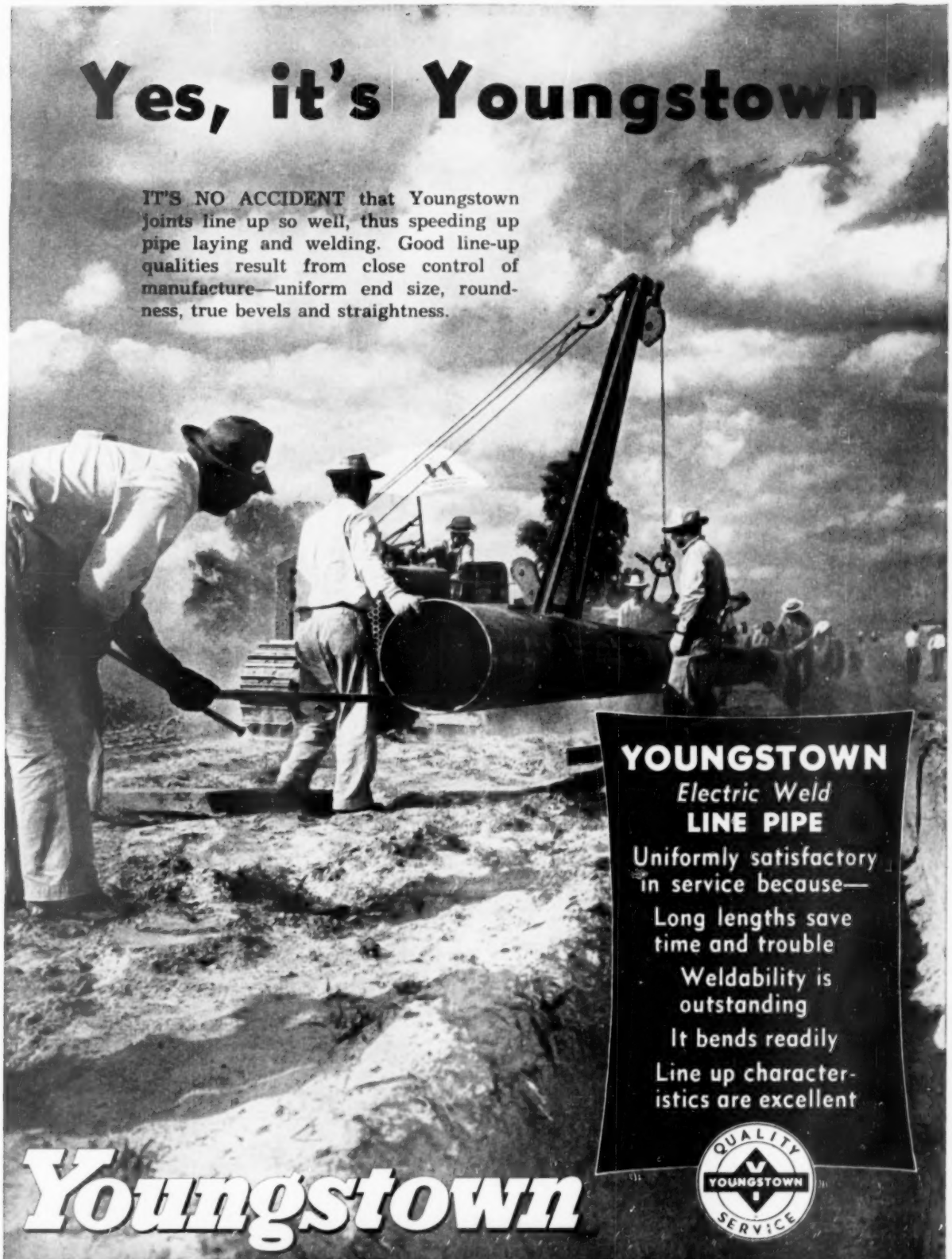

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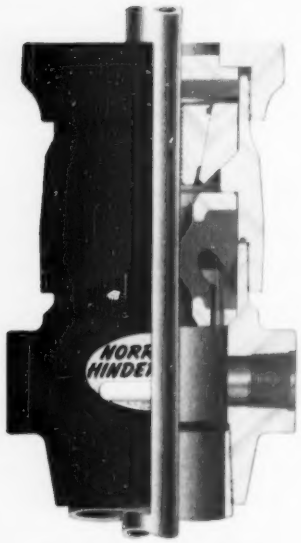
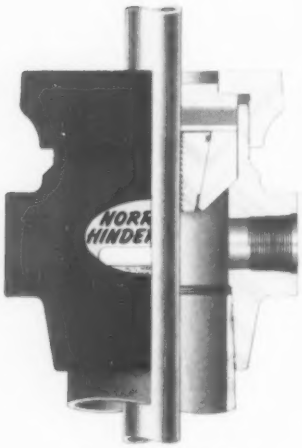


HW 4 IN 1 TUBING HEAD



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dependency on sugar production, the minister said.

The Cuban Government, he explained, would not expect to receive the oil but would require reasonable royalties and a guarantee that the needs of the domestic market would have priority over export.

It was emphasized that the Cuban Government is not willing to match expenditures for geological surveys or other exploration work, but once the exploratory work is done the government would match capital expenditures in drilling operations.

NSC Report Readied

Wartime crude hauling methods to be offered

WASHINGTON. — A committee of gas industry consultants is expected to submit a final report this week on how to provide an additional 1,000,000 bbl. daily overland wartime crude transportation from the Gulf to the East Coast.

The consultants will make their report to the National Security Council. It will include data compiled by the Petroleum Administration for Defense.

The experts are expected to recommend that converting one or more existing gas lines is the best method of meeting wartime crude transportation.

Two lines "promising" . . . Two lines, which PAD officials decline to identify, are considered the "more promising" for conversion, according to the consultants' study. However, these two lines can handle only 500,000 to 600,000 bbl. daily, which is about half the capacity desired. The upcoming report is expected to suggest how the remaining capacity can be obtained.

It is now generally accepted that the Government will have to finance any conversion of present facilities or building additional gas lines.

The question of wartime oil transportation has been broadened to include plans for overcoming the effects of an enemy attack on the United States that might affect industrial facilities. An interdepartmental industrial defense committee has been established by the Office of Defense Mobilization to develop plans for supplying oil during and after an attack. The PAD is a member of the committee.

Acting Deputy Administrator Hugh A. Stewart has declared the industry can best cope with this problem.

WATCHING WASHINGTON

Bertram F. Linz

FPC Reverses Procedure

A new procedure to prevent the waste of time and money in consideration of applications for new natural-gas pipe lines apparently is being tried out by the Federal Power Commission.

Before going into the merits of proposed new service, the commission is requiring the American Louisiana Pipe Line Co. to prove it has adequate reserves committed to support its projected line from Louisiana to Michigan.

In an order outlining the procedure to be followed, the commission said before the presentation of testimony on other matters the company must present its testimony as to gas supply and undergo cross-examination. Then proceedings would be suspended until the commission determines whether an adequate supply has been proved.

Although they have not been numerous, there have been instances in the past where the commission has held lengthy hearings on applications only to reject them because an adequate gas supply could not be shown.

In its annual report the commission noted this month that the increase in gas consumption shows signs of outpacing the gain in reserves. It pointed out that additions to reserves in 1952 were only 5.9 trillion cubic feet while production was 8.6 trillion, intimating that it felt some concern over the situation. The just published report of the American Gas Association, however, shows that in 1953 reserves increased by 11.7 trillion cubic feet while production was 9.2 trillion, an addition to reserves of 1.27 cubic feet for each cubic foot of gas produced.

Hoover Eligible For Draft

The job done by Herbert Hoover, Jr., in paving the way for settlement of the Iranian dispute may result in his being drafted for the post of Undersecretary of State, reportedly soon to be vacated by W. Bedell Smith.

Hoover, now serving as special consultant to the secretary of Iranian affairs, is one of three men who have been mentioned for the second highest position in the Department of State. The others are Robert Murphy, now deputy undersecretary, and Harold Stassen, head of the Foreign Operations Administration.

Although he accepted the appointment as adviser to Secretary Dulles as a duty not to be denied, Hoover has never given any indication of an interest in government service. But he is said to have impressed Dulles and other high officials with the ability with which he handled the delicate Iranian negotiations and conducted himself in discussions with members of Congress.

Hoover reportedly has already had an informal offer of an ambassadorship which he turned down.

Smog Bill Introduced

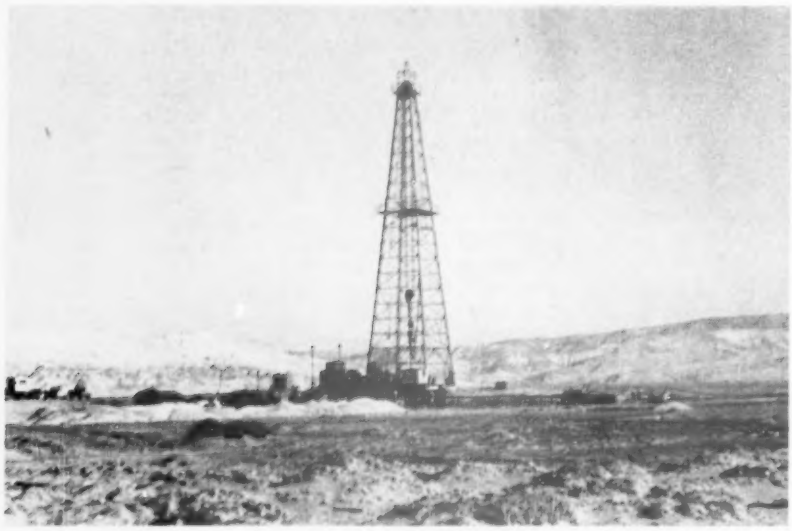
Long study of ways in which the federal Government could assist the states in their fight to eliminate air pollution has so far resulted in nothing more substantial than a suggestion that oil companies and other industrial concerns be given accelerated tax amortization of equipment installed to prevent smog.

A bill providing for tax relief has been introduced in Congress by Sen. Thomas H. Kuchel of California, where the problem is particularly acute. It is also becoming serious in New York and some other industrial centers.

The danger to health inherent in a mixture of factory smoke and low-laying fog was forcefully evidenced a few years ago in a number of deaths in Donora, Pa., and in the past 2 or 3 years in the large number of cases of respiratory diseases resulting from heavy fogs in England.

In submitting his bill for accelerated amortization of smoke prevention equipment, Kuchel told the Senate the enforcement of controls is a problem of the community and state but needs some impetus from the federal Government if industry is to spend the large sums of money required to prevent smoke and noxious gases from escaping into the open air.

The privilege of quickly writing off the cost of such facilities, the senator said, appears to be the most feasible step for the government to take at this time. Without some such action, he asserted, there is little hope for an early alleviation of the situation.



FEIRAN 2 WELL in the southern Sinai Peninsula of Egypt.

Exploration Steps Up

Southern California increasing tempo of Sinai program; three rigs now working and two more tests are planned

THE Southern California Petroleum Co., as contractor for International Egyptian Oil Co., is stepping up exploration on the Sinai Peninsula of Egypt, T. F. Woodward, president of the operating company, disclosed in Los Angeles after a trip to Egypt.

Three rigs are now at work on wildcats or extension tests, derricks are up for tests on two other structures, and two more seismic structures will be drilled as rigs become available. The company also is preparing to erect a marine loading terminal at its Wadi Feiran field on the Gulf of Suez.

Feiran 2, a ½-mile west stepout to the discovery well completed in 1949 by Standard Oil Co. (N.J.), was drilling below 7,060 ft. after having tested at a 2,000-bbl. daily rate in Miocene sands between 6,798-6,948 ft. The section, which contained about 130 ft. of net oil sand, has been cased off and the well was drilling toward Eocene limestones anticipated at about 7,500 ft. No tests have been made of these deeper prospects Woodward said.

The tests of Feiran 2 made several weeks ago produced 22.8° gravity clean oil on an open-hole formation test. The discovery well is now being produced at a flowing rate of about 90 bbl. daily with the crude used at this time for road surfacing.

About 2½ miles east, 3 Feiran was drilling below 1,750 ft., in an area which seven core holes indicate to be a separate fault block. North of 2 Feiran about 7 miles, 1 Sidri was shut down at 5,190 ft. awaiting weighting materials for killing a high-pressure salt water flow.

New structures . . . Next two structures to be tested will be the Baba and Belayim prospects, Woodward disclosed. The former lies 10 miles north of Feiran and the latter about 8 miles south. Derricks are up for both tests. The Belayim structure, most of which underlies the Gulf of Suez, is by far the largest of any of the seven mapped for drilling he said.

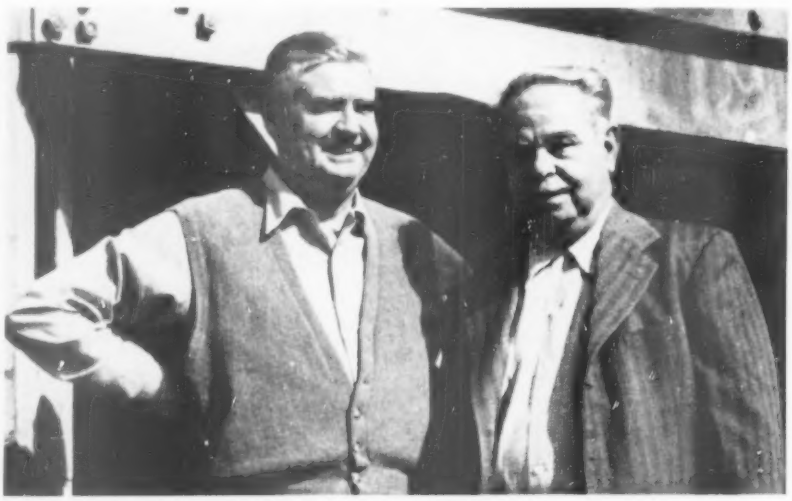
Two 10,000-bbl. tanks have been shipped to the planned terminal site. These will permit thorough testing of 2 Feiran, then will form the nucleus for the planned 50,000 to 70,000-bbl. terminal and submarine loading line. Woodward stated that the terminal could readily serve any other field discovered as it lies within a few miles of all structures mapped for drilling.

Southern California, in addition to being contractor, holds a 10 per cent interest in International Egyptian. It has established a main camp at El Shatt and a working camp at Abu Rudis. Of the approximately 300 persons on its pay roll, 19 are Americans and about 30 are Egyptian technicians.

The concession arrangement provides that the first 15,000 bbl. daily of production obtained must be sold for consumption on the Egyptian market. Beyond this level, the oil probably would be offered in European markets. Woodward said comparable crude is priced at $2.35 at Suez.

Egypt Development Due

As soon as legal technicalities have been settled, Anglo-Egyptian Oilfields, Ltd., (Royal Dutch-Shell) and Socony-Vacuum Oil Co., Inc., will embark on



AT THE LOCATION Tyler F. Woodward, left, Southern California Petroleum president, confers with Frank E. Lewis, chief geologist of the company's Mideast division.

a drilling and development program in Egypt.

According to a report from London, the program will involve an initial outlay of 800,000 Egyptian pounds, equivalent to about $2,300,000. These plans follow the recent settlement of long-standing differences between the Egyptian Government and the two companies. As a part of the settlement, the government agreed to restore to the companies some 60 exploration licenses covering blocks in the Gulf of Suez area.

Iranian Pact Drafted

Eight international companies agree on 'flexible plan' that may reopen operations; Zahedi's approval needed

OFFICIALS of eight international oil companies have reached agreement on the main details of a new organization which will allow resumption of operations by the nationalized oil industry in Iran.

Reports from London said the company representatives had worked out a "flexible plan" for the oil consortium and that a mission representing the group would submit its proposals to the Iranian Government in Teheran within the next 2 weeks.

Exact terms of the agreement were not disclosed, but an official announcement on the formation of the consortium is expected later in the week. Top executives of the five American companies flew back to New York, leaving the final details to be worked out by legal experts.

Two big issues . . . The agreement came after several weeks of hard bargaining. There were two principal issues which prolonged the discussions and prevented opening the negotiations in Teheran before the beginning of the Iranian New Year March 21 as originally hoped. These issues were:

. . . The share interests to be allocated to the individual companies. Reports are that Anglo-Iranian Oil Co., Ltd., will have 40 per cent, the five American companies a total of 40 per cent, and the remaining 20 per cent divided between Royal Dutch-Shell, and Cie. Francaise des Petroles. The American companies are Standard Oil Co. (N. J.), Standard Oil Co. of California, Socony-Vacuum Oil Co., Inc., The Texas Co., and Gulf Oil Corp.

. . . Financing of the combine. This involves the amount of money the group will pay Anglo-Iranian for part of its assets in Iran.

The question apparently was finally referred back to the State Department and the British foreign office. In addition to compensating Anglo-Iranian, the consortium must put up cash to provide working capital and make some advance royalty payments to the hard-pressed Iranian Government.

Prospects bright . . . The question now is whether the Zahedi government in Iran will accept the arrangements that have been made by the companies. Prospects for working out the final agreement on that end seem good.

Iranian Foreign Minister Entezam recently listed Iran's three main conditions for a settlement as a "reasonable" demand for compensation, continuation of Iranian management of the industry, and retention of a certain quota of the production by Iran.

Refining Offer Made

Three major European oil companies—Anglo-Iranian Oil Co., Ltd., Royal Dutch - Shell, and Cie. Financiere Belge des Petroles, S.A. (Petrofina)—have entered a joint proposal to the Greek Government for the construction of a refinery in Greece.

The companies have proposed a plant with an annual crude throughput of 1,300,000 tons, or about 26,000 bbl. daily. Estimated cost of the refinery, plus working capital, was placed at $12,000,000.

The Greek Government last summer solicited proposals for the construction of what would be the country's first refinery, offering to make a loan of up to 50 per cent of the cost. In spite of an erroneous announcement at the time that a number of major companies had offered to build the plant, the only offers then received were from the Greek-born United States motion picture executive, Spyros Skouras, and George Syrengelas, owner of the Elvyn Refineries, which operates a small, locally made lubricating-oil plant in Athens.

The Greek Government is expected to announce its decision on accepting one of the offers in the near future. Further discussions with the companies are now under way in Athens. It is believed that certain guarantees are being asked in connection with the project because of what industry officials who have studied the matter consider to be the marginal economic nature of a Greek refinery.

Douglas to Develop New Zone

Douglas Oil Co. of California is making plans to develop a shallow zone discovered by a test well with a much deeper objective on its 122,000-acre concession on the northern coast of Peru.

The 1 Douglas Pacifico logged and cored 110 ft. of saturated sand between

Cracker is Heart of Antwerp Refinery

One of the newest complete refineries built in Europe is the Antwerp, Belgium, plant of Esso Standard Refinery, S. A., an affiliate of Standard Oil Co. (N. J.). The refinery, which was officially dedicated last September, is a 25,000-bbl.-daily installation which is built around this combination unit which incorporates a Model IV fluid catalytic cracking plant.

1,910 and 2,100 ft., a showing regarded by the company as good enough for an immediate test.

The area in which the well is drilled is large enough for a 30 to 40 well program as Point Lobo extends 1,800 ft. out from the shoreline and could be used for shallow-well drilling sites.

The 1 Pacifico, located on the beach, has reached 4,312 ft. and is expected to be continued to between 5,000 and 8,000 ft.

Another well, 1 Douglas Lobitos, started earlier on the Lobitos concession about a mile north, is drilling ahead at 6,371 ft.

Plungar Well Completed

D'Arcy Exploration Co., Ltd. (Anglo-Iranian) has completed two productive wells and is drilling a third in its new oil field in England at Plungar near Nottingham.

The drilling well, No. 3, is 1,000 ft. from Plungar 2 in which production was found at 3,029 ft. Pumping equipment is now being installed. A short distance away is Plungar 1 from which 3½ tons daily (about 25 bbl.) are being pumped. Locations have been made for Nos. 4 and 5 with drilling scheduled to start in April on No. 4.

D'Arcy expects soon to resume drilling in its exploratory test at West Drayton, near Tuxford, Nottinghamshire. Last year this hole reached the limit of the equipment at 2,600 ft., and a heavier rig is being moved in to carry the test to around 3,200 ft.

International Briefs

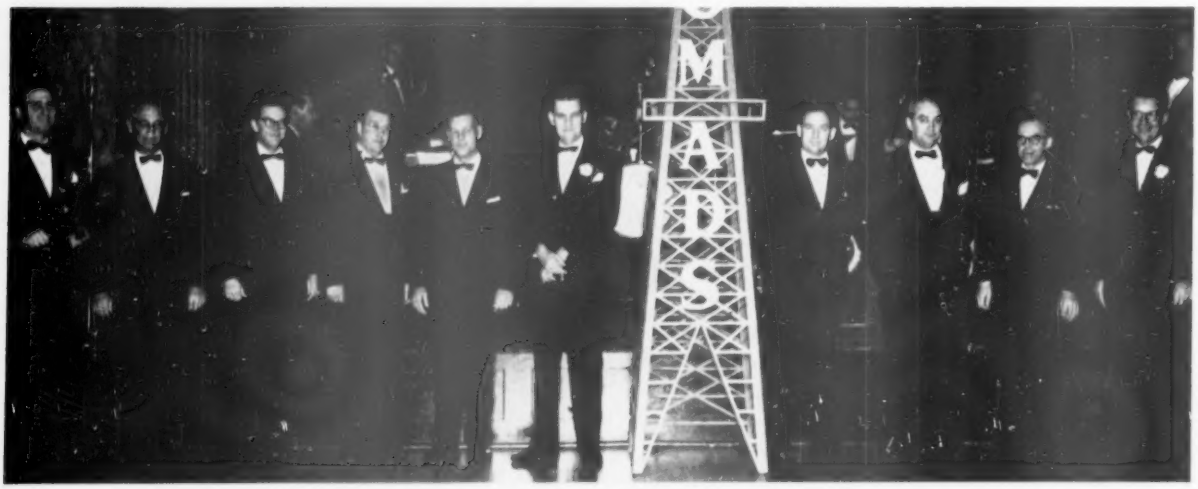
A small lubricants and paraffin refinery is planned at Pisco, a port about 150 miles south of Lima in Peru, by an European firm, Helios Co. The plant is designed to produce 60,000 tons of lubricating oil, 10,000 tons of paraffin, 10,000 tons of asphalt, and 10,000 tons of fuel oils, in total equivalent to about 2,000 bbl. daily. Principal stockholder and president of Helios is Alejandro Mamole, who is also the principal owner of Parafina del Plata which built a similar plant in Argentina last year. The project is being financed by German capital, and the equipment is to be obtained in that country. A contract for design is expected to be signed by Hydrocarbon Research.

Manabi Exploration Co.'s operations in Ecuador last year resulted in the production of an average of 1,158 bbl. daily and the drilling of 57,025 ft. of hole. This compares to 1,348 bbl. daily produced and 58,410 ft. drilled in 1952. Last year the company had two deep rigs active. The major producer in Ecuador is Anglo-Ecuadorian Oilfields, Ltd., which accounts for most of the remainder of Ecuador's total output of about 8,300 bbl. daily.

A diesel-engined passenger automobile will be placed on the market in Britain for the first time. Standard Motor Co., Ltd., announced in London that a diesel engine will be fitted as an alternative power unit on its four Vanguard models, and that the six-seater will travel 45 miles on a gallon of fuel oil. The announcement was of interest in view of the trend in Britain and elsewhere in Europe toward diesel-powered vehicles. The petroleum industry in Europe has made heavy investment in catalytic cracking and other second-stage processing facilities to produce more and better gasoline, but consumption has been throttled back by extremely high taxes in many countries. In West Germany, BP Benzin und Petroleum, GmbH., published a report recently pointing out that the number of passenger cars with diesel engines had increased tenfold in that country from July 1950 to July 1953.

Shows of gas have been reported at 1,400 m. (4,600 ft.) in a wildcat well being drilled at Djebel Borga in the Sahara Desert region of southern Algeria. The operating company is Cia. de Recherches et d'Exploitation de Petrole au Sahara (C.R.E.P.S.), an affiliate of the French company, Regie Autonome des Petroles.

The launching of 11,500 ft. of offshore oil line into the Atlantic Ocean at Accra, British West Africa, has been successfully completed by Collins Construction Co., Port Lavaca, Tex. The line, consisting of 12⅝-in. Gunite-coated pipe, is a part of a project contracted to Taylor Woodrow, Ltd., London, by Socony-Vacuum, Inc. (West Africa).



Houston Nomad Chapter Elects Officers for 1954

Officers of the Houston Nomads, pictured left to right, are Robert K. Franklin, Rolo Manufacturing Co., president; W. O. Hedrick, McEvoy Co., secretary; W. L. Childs, Reed Roller Bit Co., vice president; H. Ben Young, Mission Manufacturing Co., treasurer; E. M. Fontaine, National Tank Co., regent; H. J. Wood, Lebanon Steel Foundry, regent; B. H. Pickard, Tubescope Co., assistant treasurer; Fred A. Christanelli, Baroid Sales Division, sergeant-at-arms; E. W. Louden, Bariod Sales Division, assistant secretary, and Harry E. Estes, A-1 Bit & Tool Co., executive secretary. Otis B. Walker, McCullough Tool Co., deputy sergeant-at-arms, is not shown.

PERSONALS

Jersey Veteran

Haider's varied career leads to top I.P.C. job

MICHAEL L. HAIDER, International Petroleum Co., Ltd.'s new president, has literally grown up in the Standard Oil Co. (N. J.) family of companies. His career exemplifies the company policy of training and developing its own executive talent.

"Mike" Haider, as he is known to his friends, will take over as International's new president after April 1. He will spend several months familiarizing himself with the company's operations in Latin America and then settle with Mrs. Haider in Coral Gables, Fla., where International's executive offices are located.

The company, of which Haider has been made president, is an 82½ per cent owned affiliate of Jersey Standard which carries on integrated activities in South America. It has a daily production of approximately 105,000 bbl., including a one-quarter interest in the output of Mene Grande Oil Co. in Venezuela, a major refinery in Peru, direct marketing in Colombia and Peru, and sales in several other countries.

Haider grew up in Mandan, N. D., at a time when the oil possibilities of that state were little suspected. After 1 year of high school, he moved with his family to Los Angeles. He later took 2 years of work at the University of Southern California and then finished at Stanford University in 1927 with a degree in chemical engineering.

His first job after graduation was as an analytical chemist with a cement company in California.

Haider joined Carter Oil Co., Jersey's Mid-Continent affiliate, in 1929 and spent the next 6 years in engineering and field work in Oklahoma, about half of this time in Seminole. He became chief petroleum engineer in 1937 and a year later became Carter's chief engineer.

In 1938 he was moved to New York as manager of production engineering and research for Standard Oil Development Co. During his 8 years in this position, Haider supervised all phases of production research. He played a leading part in the preparation of the book, "Reservoir Efficiency and Well Spacing," which was published in 1943 as a joint report of the thinking of the Jersey companies on these subjects.

After a year as an executive assistant in the Jersey Standard producing department in New York, Haider was shifted to Canada as general manager of the production department of Imperial Oil, Ltd., which in the case of this company handles both exploration and production. Haider brought luck to Imperial, for less than a year later the company made its famous Leduc discovery after years of unsuccessful exploration. Previously Imperial had concentrated its work in the foothills belt and in southern Alberta in search of Turner Valley-type fields.

In 1948, Haider went on Imperial's board of directors and later became a vice president of the company. In this position his duties broadened out from general production into other phases of the company's business as general corporate matters, pipelines, etc. He returned to Jersey Standard's head office in New York in 1952 and since that time he has been following producing operations of Jersey interests in both hemispheres as deputy coordinator of production.

L. P. Maier, formerly president of International Petroleum Co., Ltd., has been elected chairman of the board of the company. Maier has been active in the petroleum industry since he served as a civil engineer with a Jersey affiliate in Mexico in 1920-21. Much of his service has been in South America where he has been in executive posts with Andian National Corp., Ltd., and Tropical Oil Co., as well as International Petroleum.

Roy West, geologist for Gulf Oil Corp., has been transferred from Billings, Mont., to Bismarck, N. D.

A. D. Turquette, formerly associated with Globe Oil & Refining Co. and Lario Oil & Gas Co., has become a geological consultant in Denver.

Dorman J. Morsman has been elected secretary-treasurer and a director of Keating Drilling Co., Tulsa.

Louis W. Hall has been made field engineer for the Slaughter area of Texas by Stanolind Oil & Gas Co. His headquarters will be in Brownfield.

Raymond G. Loper has resigned as professor of petroleum engineering at Louisiana State University in Baton Rouge to join Western Co., Midland, as operations training coordinator.

James D. Stahl, an engineer with Union Producing Co., Houston, for the past 13 years, has been promoted to district petroleum engineer. Stahl joined Union in Shreveport in 1941 and was transferred to Houston in 1951 as assistant petroleum engineer. Later he was advanced to petroleum engineer, a position held until his recent promotion.

Earl A. Hapke, graduate of the University of California, has joined Taylor Oil & Gas Co. as a geologist in the company's office in San Angelo, Tex.

I. J. Fisher has been named safety director for the American Association of Oilwell Drilling Contractors, replacing **Doyle Settle,** who has resigned to enter private business. Fisher was safety engineer with Texas Instruments, Inc., prior to joining A.A.O.D.C.

C. L. Cornelius has resigned as assistant division supervisor of Gulf Oil Corp.'s land department at Fort Worth to join Ralph Lowe and Lowe Petroleum Co., Midland, Tex., as head of the Lowe oil operations in the Fort Worth area.

M. W. Crawford, formerly operations manager for International Petroleum Co., Ltd., at Talara, has been transferred to Bogota where he will be assistant general manager of International

PERSONALS

Petroleum (Colombia), succeeding **I. H. Hughes. Murray Matheson** is the new operations manager at Talara. Hughes has returned to the United States where he has taken an interest in Manning & Nance, Inc., workover and drilling contractors.

R. D. Holland and **W. H. Gibson** have been appointed assistants to the manager of the geophysical division of

R. D. HOLLAND

W. H. GIBSON

The Texas Co.'s producing department, effective April 1. Gibson will have headquarters in Houston and Holland will be located at Calgary, Alta., where he will be in charge of geophysical operations in western Canada.

Tom Gaines, assistant Rocky Mountain division petroleum engineer in Denver for The Texas Co. since 1950, has been made division petroleum engineer at Calgary, Alta., for Texaco Exploration Co.

A. E. Collins has resigned as division engineer in Midland, Tex., for Wilshire Oil Co. of Texas to become division engineer for Vickers Petroleum Co., Inc., at Wichita. He was named division engineer for Wilshire in March 1953 and is being replaced at Midland by **Albert T. Sindel, Jr.,** formerly division engineer in West Texas for Ashland Oil & Refining Co.

Herbert Parker has been promoted from assistant chief geologist to chief geologist of Sun Oil Co.'s Gulf Coast division. He replaces **K. V. Schroeder,** who is now acting as assistant manager of the Gulf Coast division and retains his position as land department manager.

N. Duck has been advanced by Shell Oil Co. of Canada, Ltd., from chemist at its Montreal East refinery to assistant manager of the laboratory. **J. Whittaker** also has been promoted from technologist in the Montreal refinery to assistant department manager of the catalytic cracking unit's light-ends section.

Alfred L. Hartridge and **Stuart F. Kosters** have been made vice presidents of Stone & Webster Engineering Corp., New York and Boston.

Robert Wakefield, geologist for The Texas Co., has been transferred from Denver to Bismarck, N. D.

Dean D. Durall has been promoted by Gulf Refining Co. from engineer trainee at Kilgore, Tex., to well tester at Krotz Springs, La.

A. A. Kennedy, general manager of O.M.S. Drilling Co., has been transferred from Glendive, Mont., to New Orleans.

Ernest R. Frazier, production engineer for Magnolia Petroleum Co., has been transferred from Midland to Electra, Tex.

Paul N. Templeton, secretary and tariff expert of Magnolia Pipe Line Co., has been elected to the firm's board of directors.

James E. Skidmore, petroleum engineer, formerly with Phillips Petroleum Co. at Odessa, Tex., has joined Carleton D. Speed, Jr., at Bowie, Tex.

John M. Heller, area production engineer for Gulf Oil Corp., has been transferred from Wendover, Utah, to Worland, Wyo.

E. D. Blackburn has been transferred from Bartlesville to Ponca City, Okla., as superintendent of Cities Service Oil Co.'s new North Oklahoma district. **Ed McGuire** also has been transferred from Bartlesville to the new office as district engineer.

M. N. Broughton, Houston, has been appointed staff geologist to **E. R. Filley,** vice president in charge of the producing department of The Texas Co., effective April 1. **J. A. Quigley** will replace Broughton as division geologist for the South Texas division of the producing department.

K. J. Kitzmiller, formerly manager of the cracking department of Shell Oil Co.'s Houston refinery, has been made manager of the gas department. His former assistant, **B. Fogelman,** has been named manager of the catalytic cracking department and **C. L. Marshall,** formerly assistant manager of the lube-oils department, now heads the thermal cracking department. At Shell's refinery at Martinez, Calif., **A. P. Cupit** has been advanced from assistant to chief engineer. **E. D. Underwood,** formerly senior engineer at the head office, has been appointed assistant to Cupit.

R. A. (Rudy) Hamill, Tulsa, has been promoted to chief gager for Service Pipe Line Co., replacing **Bert Martin,** who has retired after 35 years with the company.

W. C. (Bill) MacQuown, Jr., has resigned, effective April 1, as head of Deep Rock Oil Corp.'s Rocky Mountain operations to join Sohio Petroleum Co. as chief geologist in Oklahoma City.

H. D. Greensides has been promoted by Gulf Refining Co. from assistant district superintendent of the gas and gasoline department at Houston to zone supervisor of the gas and gasoline department at New Orleans.

R. W. Bond, Shell Oil Co., New York; **J. R. McWilliams,** Tulsa, formerly with Skelly Oil Co. and Carter Oil Co.; and **Harold E. Berg,** Tide Water Associated Oil Co., Tulsa, have been presented Citations for Service for their work in the Mid-Continent district of the American Petroleum Institute's Division of Production.

E. W. Harter has been advanced by The California Co. from Gulf Coast division petroleum engineer in the production department to the new position of Gulf Coast division drilling engineer. **W. J. Hunter,** formerly North Louisiana-Mississippi division petroleum engineer, has succeeded Harter. **J. N. Pederson,** formerly petroleum engineer on the staff of the assistant chief petroleum engineer, has replaced Hunter.

Donald L. Campbell has been appointed associate director of the process division of Standard Oil Development Co. **Burton C. Belden,** formerly an assistant director of S.O.D.'s process division, has replaced Campbell as chief process engineer in the firm's Esso engineering department. **R. S. Piroomov,** formerly manager of the technical service division of Esso Standard Oil Co.'s East Coast manufacturing, has replaced Belden in the process division. **F. William Schumacher,** formerly associate director of the process division, has succeeded Piroomov as manager of Esso Standard's technical service division. The appointments are a step in a coordinated plan for development of management personnel.

PERSONALS

Howard B. Keck, president of Superior Oil Co., Los Angeles, has been elected to the board of directors of Gulf Interstate Gas Co., Houston.

T. G. McKenna has been advanced from assistant superintendent to superintendent of Shell Chemical Corp.'s plant at Denver.

A. L. Richardson has resigned as district geologist at Scottsbluff, Neb., for Sinclair Oil & Gas Co. to become a consultant.

W. O. ALLEN

Walter O. Allen, construction superintendent for United Gas Pipe Line Co., has been named assistant manager of the San Antonio district. Allen has been with United Gas and its predecessor since 1923. In his new capacity Allen will assist **W. W. Clopton,** San Antonio district manager.

W. G. Skelly, president of Skelly Oil Co., Tulsa, has been named as one of five Oklahomans who will be presented Distinguished Service Citations by the University of Oklahoma at its seventh annual achievement day dinner April 8. Recipients were chosen on the basis of their achievement in advancing a "better contemporary society and their efforts to make Oklahoma a better known state."

C. F. Dohm, vice president and exploration manager of Conorada Petroleum Corp. for 4 years, has been elected president and a member of the board of directors. He succeeds **A. A. Curtice,** who will remain with the company in a consulting capacity. Conorada is the foreign exploration and concession-negotiating subsidiary of Continental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp.

F. G. Watson has been promoted by Shell Chemical Corp. from assistant superintendent to superintendent of its plant at Houston, succeeding **R. L. Kittle,** who has been made manager of manufacturing operations with offices in New York. **D. B. Luckenbill,** formerly senior technologist in the manufacturing - development department, has been transferred from New York to Houston to succeed Watson. **E. S. Martin,** formerly department manager in charge of operations at the Houston plant, has replaced Luckenbill in New York.

Joe Robbins, geologist, has resigned from Union Oil Co. of California. He was in the firm's Williston basin division office in Bismarck, N. D.

Dr. R. D. Beckwith, senior geologist for Union Oil Co. of California at Bismarck, N. D., has been transferred to the firm's office in Houston.

Bruce H. McCully has been promoted by Consumers Cooperative Association, Kansas City, to the new post of first assistant general manager. Since 1949 he has been one of three assistant general managers and has been in charge of oil production and refining. He now assumes administrative responsibilities in the general operation of the organization.

E. W. Masters has been appointed executive assistant to **S. F. Bowlby,** vice president of Shell Oil Co., headquartered in Los Angeles. **B. P. Eastin,** division production manager at Ventura, has replaced Masters as area production manager for Shell's Pacific Coast exploration and production area.

James M. Cunningham, Rayne, La., consulting geologist, has been elected president of the newly organized Louisiana Independent Producers and Royalty Owners Association, headquartered in Baton Rouge. Other officers are **Paul E. Parsons,** Jennings, vice president; **Rodgers S. Wilson,** Calhoun, chairman of the executive committee; **Warren S. Axtell,** Lafayette, secretary; and **Charles E. Kelly,** executive vice president and treasurer.

C. Calvin Naylor has been promoted by Sun Oil Co. from operating assistant in the catalytic, gas and alkylation division of the research and development department's crude-oil testing laboratory to assistant to **W. T. Askew,** manager of Sun's refinery at Marcus Hook, Pa. **William J. Devonshire, Jr.,** formerly a plant general foreman, has replaced Naylor. **Walter C. Huffman** also has been advanced from petrochemical plant general foreman to assistant superintendent in charge of petrochemicals. **Calvin Stubbs,** formerly petrochemical plant supervisor foreman, has succeeded Huffman.

King P. Kirchner has joined Unit Drilling Co., Bristow, Okla., as engineer and assistant to the president.

Hunter C. Gohean, geologist for Houston Oil Co. of Texas, has been transferred from Houston to Lafayette, La.

H. H. Defenbaugh, production foreman for Sinclair Oil & Gas Co., has been transferred from Bristow to Stonewall, Okla.

John H. Jennings has resigned as chief evaluation engineer for Deep Rock Oil Corp., Tulsa, to join Colorado National Bank in Denver as manager of the oil and gas loan department, a newly created position.

John H. N. Evinger, formerly production superintendent for A. N. Hendrickson, Midland, Tex., has joined Falcon Seaboard Drilling Co. as production superintendent at Fort Morgan, Colo.

Berlin Boyd, Jr., has been transferred from the Standard Oil Co. (Ind.) refinery at Casper, Wyo., to Mandan, N. D., where he will be general foreman of the process department of the 30,000-bbl. refinery being built by Standard. **W. G. Roesch** also has been transferred from Standard's Chicago office to Mandan as chief of the engineering division.

Fred Neslage, West Pampa Repressuring Association, Pampa, Tex., has been elected chairman of the Mid-Continent district of the American Petroleum Association's Division of Production. He succeeds **Jack Abernathy,** Big Chief Drilling Co., Oklahoma City, who has been elected chairman of the advisory committee. **C. A. Husted,** C. A. Husted Contractors, Pampa, has been chosen secretary-treasurer.

H. Hilling, formerly managing director of Shell Nederland, N.V., at The Hague, has been appointed general representative of N. V. de Bataafsche Petroleum Mij. at Jakarta, Indonesia, succeeding **M. F. G. J. W. Bolderdijk,** who has retired. Hilling has been with Royal Dutch-Shell since 1926, and has spent most of his career in the East Indies. **K. Scholtens,** who joined B.P.M. in 1924 as a construction engineer in drilling operations, has been appointed managing director of Shell Nederland, N.V. Prior to his recent appointment,

PERSONALS

Scholtens was general attorney, Eastern Area Management, at B.P.M.'s head office at The Hague.

R. Wayne Russell has opened offices in Dallas as a petroleum consultant, specializing in oil and gas property evaluation and management.

J. W. Cunningham has joined Dow Chemical Co.'s Texas division as a planning engineer in the organic laboratory at Freeport.

John R. Cox has resigned as district geologist in Kansas for Midstates Oil Corp. to become a consultant in Wichita, Kans.

P. E. Lakin, vice president and director of Shell Oil Co., will retire March 31 after 39 years with the company. He plans to remain in San Francisco, where he will enter private business. **S. F. Bowlby,** vice president in charge of exploration and production for the Pacific Coast area, will become the senior Shell officer on the West Coast following Lakin's retirement.

James A. Burhan, Calvert Exploration Co., has been elected president of the Dakota Petroleum Club, Bismarck. Other officers include **Rod Tetrick,** Socony-Vacuum Oil Co., Inc., vice president; **Robert Anderson,** Carter Oil Co., secretary; and **Jack Pierce,** Rinehart Oil News, treasurer. Directors are **Richard Frawley,** Sinclair Oil & Gas Co.; **Wendell Smith,** consultant, and **Rex Tarr,** Cities Service Oil Co.

B. H. Mull, formerly Shell Oil Co.'s division production engineer at Long Beach, has been moved into the Los Angeles office as producing geologist for the western area. **K. F. Pilgram,** development engineer formerly stationed at Ventura, has succeeded Mull at Long Beach. **Earl Armbruster,** division engineer at Bakersfield, has been transferred to Shell's New York office.

Dr. William Bowman has been made vice president in charge of operation and **Dr. Max Neuhaus** vice president in charge of development by Jefferson Chemical Co., Inc. Dr. Bowman is responsible for current operations of the company dealing with manufacture and sale of its regular products. Dr. Neuhaus is responsible for activities dealing with development of new products until they are turned over to operations for commercial manufacture and sale.

Ernest Higgins, foreman with Amerada Petroleum Corp., has been transferred from Bloomington, Tex., to Elkhart, Kans.

Edgar Cobb, Jr., field engineer for Deep Rock Oil Corp., has been transferred from the firm's general office in Tulsa to Wichita Falls, Tex.

Carlos Ferguson, formerly geologist for Magnolia Petroleum Co. at San Antonio and Abilene, Tex., has joined Norman D. FitzGerald, independent operator at Abilene, as chief geologist.

Noble D. Jones, Jr., has been promoted by Humble Oil & Refining Co. to senior mechanical engineer (supervisory) in the design department of the engineering division at the firm's refinery in Baytown, Tex.

G. M. Bell has been promoted to assistant to the manager of the Oklahoma division of The Texas Co.'s producing department, effective April 1. He will succeed **C. F. Elder,** who has been promoted to the staff of the vice president in charge of the producing department. **E. R. Filley, Jr.,** presently assistant Oklahoma district superintendent, in Tulsa, will succeed Bell as division petroleum engineer.

O. L. Clevenger, N. O. Felps, and **N. D. Jones, Jr.,** have been promoted to senior mechanical engineers at Humble Oil & Refining Co.'s refinery at Baytown, Tex. **T. S. Fennema** has been promoted to engineering specialist. Clevenger will be in charge of the mechanical-engineering group in the design department. Felps will be in charge of the lube-extraction and treating group in the maintenance department. Jones will be in charge of the civil-engineering group in the design department, and Fennema will be an engineering problem specialist.

R. E. Hansen, Leeds & Northrup Co., Houston, has been installed as new president of the Houston section of the Instrument Society of America. Other new officers include: **L. C. Books,** Shell Oil Co., Deer Park, Tex., vice president; **Glen DorFlinger,** Fischer & Porter Co., Houston, secretary; **V. O. McConnell,** Dow Chemical Co., Freeport, Tex., I.S.A. councilor; **John F. Draffen,** Monsanto Chemical Co., Texas City, I.S.A. alternate councilor; and the following chairmen: **E. E. Kleir,** Foxboro Co., Houston, program; **J. C. Walker,** Esch-Condit, Inc., Houston, membership; **O. J. Howell,** Humble Oil & Refining Co., Baytown, Tex., constitution; and **J. R. Martin,** Humble, Baytown, publicity.

Joe Ward, division manager for Ralph E. Fair, Inc., Midland, Tex., and before that division geologist at Midland for Mid-Continent Petroleum Corp., has resigned to become a partner in a new consulting firm, McCollum & Ward, in Midland.

C. B. Barker, pipeline-maintenance foreman, has been transferred by Shell Pipe Line Corp. from Gohlke to Sealy, Tex. Other company changes include transferring **M. C. Brown,** engineer, from Colorado City to Houston, and promoting **C. L. Fluitt** from assistant pipeline-maintenance foreman at Sealy, Tex., to pipeline-maintenance foreman at Gohlke, Tex., **C. F. Gordon** from assistant pipeline-maintenance foreman at Goodrich to pipeline-maintenance foreman at Opelousas, La., and **E. D. Kinney** from assistant mechanical supervisor to mechanical maintenance supervisor at McCamey, Tex.

DEATHS

John R. Jobe, 43, owner of John Jobe Co., oil-well firefighting firm headquartered in Houston, died in Houston March 18 of acute appendicitis.

William Nelson Collins, 80, retired driller, died recently in Ventura, Calif., following a heart attack.

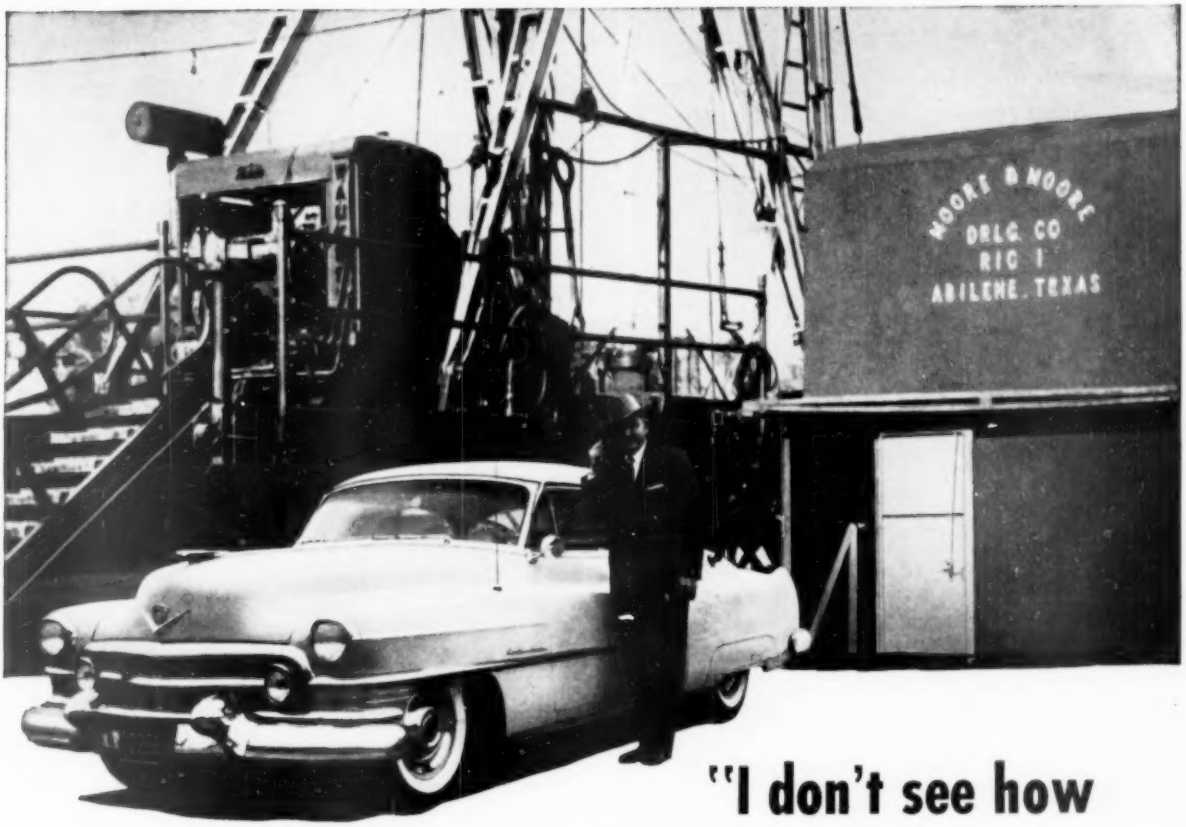
William F. Shiells, 74, retired driller, died recently at Oxnard, Calif.

Kenneth D. Sanders, 47, right-of-way and real estate manager for Tide Water Associated Oil Co., died recently in Arcadia, Calif.

Vitale F. Ricciardi, 54, assistant to management, marine department of The Texas Co., died in New York recently following a long illness.

James Reynolds, 73, retired pumper for Shell Oil Co., died recently in Long Beach, Calif.

Clarence V. Armor, 75, retired independent operator, died in Dallas March 18. Armor, originally a Pennsylvanian, was active in developing oil fields throughout the country.



"I don't see how we ever did business without RCA 2-Way Radio"

—says L. H. MOORE of Moutray-Moore Drilling Co., Inc. and Moore & Moore Drilling Co.

"AS A CONTROL MECHANISM, our RCA Fleetfone equipment in my home, the home of our drilling superintendent shop, office, 6 rigs and 10 cars, keeps us informed as to the activities in West Central Texas for which we are responsible and assures us that our plans and policies are being carried out according to schedule," says Lamar H. Moore.

"Oilfield equipment has to be tough to stand up to the treatment it must receive, so, when we bought 2-way radio we selected RCA as the radio best suited to our requirements," says Mr. Moore.

"For all-round coverage, for operation under tough field conditions, we chose RCA Fleetfone Radio. And it has measured up in every way. Rough roads and back country give equipment a gruelling workout every day in the week. RCA 2-way radio is the one that proved it can take it."

RCA 2-Way Radio increases efficiency

"RCA 2-Way Radio has increased our efficiency in drilling operations," concludes Mr. Moore. "Efficiency in service rendered to the operator is a must to a drilling contractor. Two-way radio has enabled us, by giving direct contact with the rigs, to obtain a peak of efficiency which we never dreamed possible."

In everyday routine contacts . . . in emergencies . . . RCA 2-way radio can help make your job easier—can help you cut your costs. Investigate RCA 2-way radio. **MAIL COUPON.**

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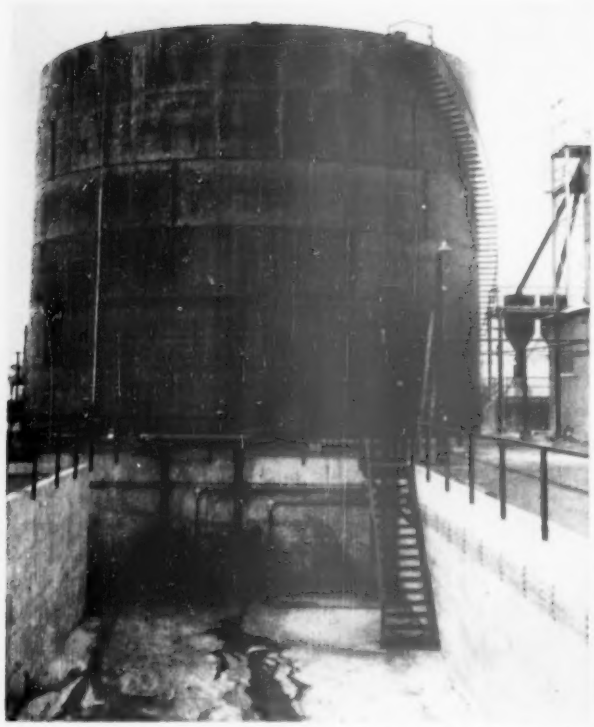


Waste water from General Petroleum Corp.'s Torrance refinery gravitates to this underground skimming pit, the top of which is 12 ft. below ground. Tank in the background is the raw-water surge tank.

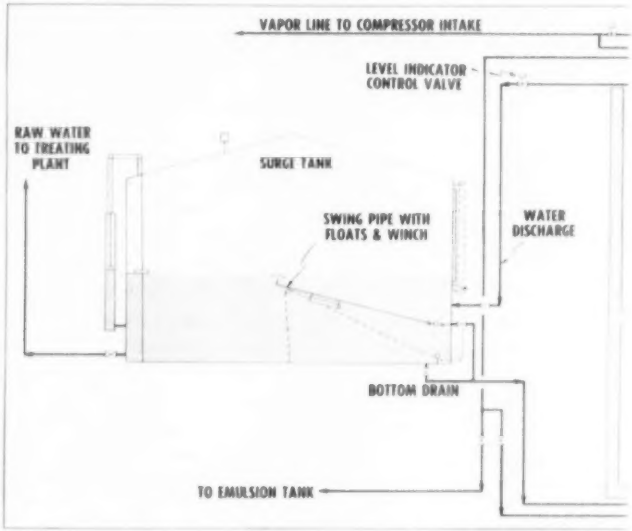
Chemical treatment and sludge separation of waste water is carried out in this Accelator. The two General Petroleum engineers watching operations are Worth Dickey and Lester Battelle.

Good Citizenship + Good Engineering =

Efficient Disposal of Waste Water

Recently completed facilities represent expenditure of over $200,000. Recovery of 175 bbl. of oil per day is realized

by D. H. Stormont
West Coast Editor



Detailed diagram of waste-water disposal

CONTINUED plant expansions and addition of more complex processes so overloaded the waste-water disposal system of General Petroleum Corp.'s Torrance, Calif., refinery that last year it was found necessary to revamp the treating facilities.

The resulting waste-water purification plant is probably the most modern of any West Coast refinery. Such an efficient cleaning job is being done that it is planned to reuse about two-thirds of the volume now being dumped into the Los Angeles County waste-water disposal system.

Principal innovation of the new system is an underground skimming pit on which a vacuum is maintained by means of conventional vapor-recovery equipment. Chemical treatment of the raw water and filtration of the resulting sludge in a precoat rotary filter is accomplished almost entirely automatically.

The new facilities represent an expenditure of over $200,000. The investment was made primarily as an effort of good citizenship with respect to air and water-pollution problems. However, because of the recovery of

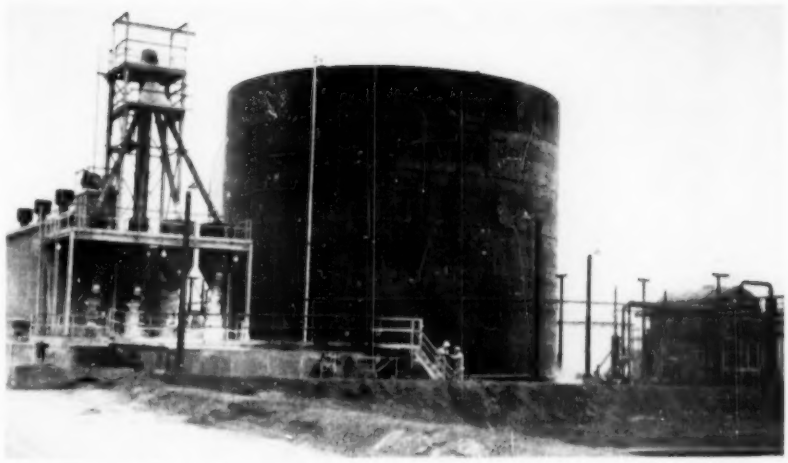
approximately 175 bbl. of oil per day, on the average, the company is confident the investment will have a long-term payout.

Waste-water collection . . . Two separate systems are used to collect waste waters in the refinery, "clean" water in one and "oily" water in the other. The purification facilities described hereafter are for the oily water, comprised of accumulator waters, cooling-tower blowdown, and that collected from sumps and bled from storage tanks. The total amounts to an average of about 30,000 bbl. daily.

The composite stream gravitates through an 18-in. line to the collecting basin of an underground, modified A.P.I.-type separator, the top of which is 12 ft. below ground level. Having the over-all dimensions of 100 by 25 by 13 ft., a dividing wall separates the lower half into two basins approximately 6 ft. wide.

As shown in the cross-section diagram, the dirty water enters at one end, flows through a slotted distributor box, and drops into the separator basin. Any trash contained is skimmed off in the receiving pit by means of a traveling screen, which brings the refuse to ground level for disposal. Any dirty water picked up in vacuum trucks also is dumped into the separator by means of a 4-in. line with a surface connection.

As the water slowly moves along the divided basin, suspended solids settle out. If not removed, these in time would lower the separator's efficiency because of the reduced effective volume and retention time. A novel scraper system prevents this from occurring.



Sludge recovered from the treating process is pumped to the rotary precoat filter at right where excess water is removed.

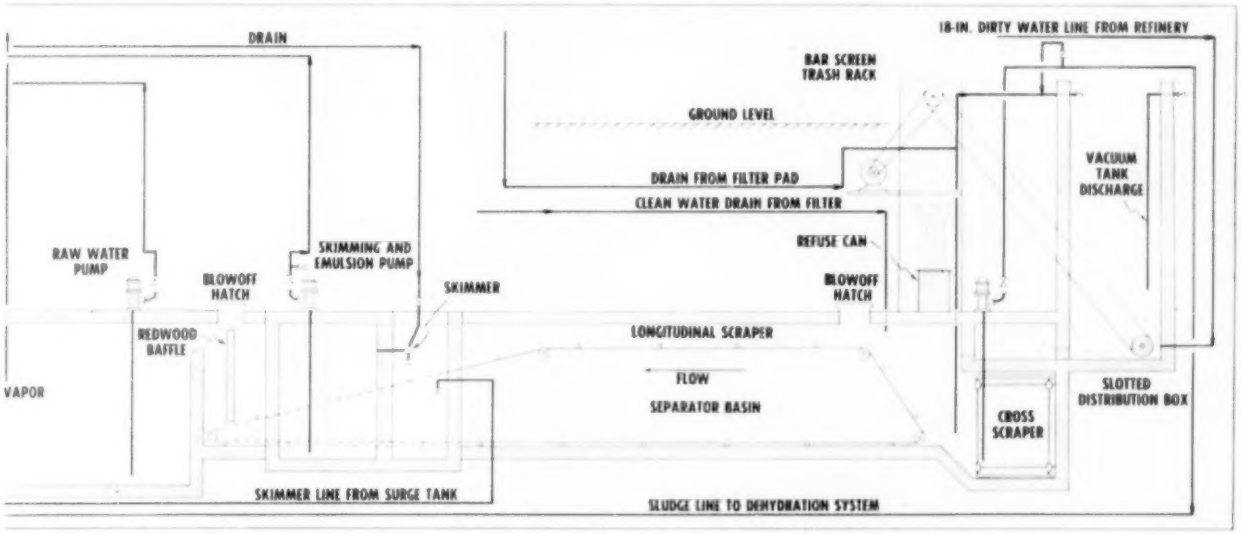
Two longitudinal scrapers, rotating countercurrent to the flow, move the deposited sludge toward the entrance end of the basin. There a cross-scraper moves it to one side. A vertical centrifugal sludge pump then continually withdraws it from the basin and pumps it to a large storage tank. Or by changing the valve lineup, it can be combined with the raw water en route to the treating plant.

Vapors freed in the basin are collected by means of a 4-in. line connected to a compressor in the nearby dehydrator plant. A regulator installed in the vapor line acts to maintain a 1-in. (water) vacuum at all times. Thus where formerly allowed to escape into the atmosphere, the collected vapors are assisting in making the plant economically feasible.

At the down-stream end of the basin a baffle diverts the flow of water downward and traps the freed oil and emulsion. Rising from the other side of the baffle, the water passes over a weir into a raw-water basin. From there it is removed by a centrifugal pump and run to a 1,000-bbl. surge tank. A pilot-operated motor valve in the flow line acts to maintain fluid level in the basin within preset limits. Any oil freed in the surge tank is removed through a swing-pipe skimmer and returned to the separator skimmed-oil section.

In the diagram, so that the layout could be better illustrated, the oil-

(Continued on page 112)



unit. Oil and emulsion trapped in the pit are lifted by a centrifugal pump and moved to the dehydration plant.

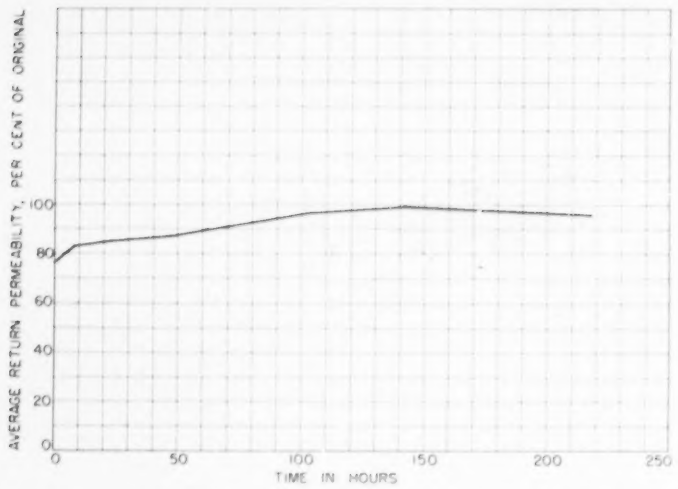


Fig. 1—A typical oil-base-emulsion drilling fluid's return-permeability curve.

THE AUTHOR SAYS

The term oil-base emulsion drilling in fluids is somewhat confusing in our present system of nomenclature as, strictly speaking, all present oil-base drilling fluids are emulsions of water in oil.

Commonly, oil-base drilling fluids are made up and run with a minimum of water. It is seldom that such drilling fluids are run above 15 per cent water by volume, although successful systems have used as much as 25 per cent by volume.

For purposes of classification, an **oil-base-emulsion** fluid has been arbitrarily designated as any **oil-base** drilling fluid originally made up and intended to be maintained with a water content above 15 per cent.

Oil-base emulsions are specialty fluids and their use requires close knowledge of their properties. Primarily, they are designed for use in low and moderate-pressure completions.

Oil-Base-Emulsion Drilling Fluids Offer Improved Completions and Economy

by Charles C. Wright

Fig. 2—With a properly serviced oil-base-emulsion drilling fluid the shale cuttings will be of this magnitude.

OIL-BASE-EMULSION drilling and completion fluids have been used in over 400 wells in the past 3 years. Superior completions are claimed for their use and they have replaced costlier completions in many fields. Besides yielding high completion and long-time productivities, the oil - base - emulsion fluids are inert to the usual contaminants and can be compounded to low mud weights when desired.

Improved oil - base - emulsion muds are now available which suspend cuttings and which do not cause hydratable material to swell.

The first recorded field use of an oil-base-emulsion drilling fluid was in August 1950, in the Los Angeles Basin. This drilling fluid was made up with 40 per cent water emulsified in a refined oil, and its performance was sufficiently impressive to justify its continued use throughout the basin.

At least three other oil-base-emulsion drilling fluids have been used since the appearance of the first.

Oil-base-emulsion drilling fluids have come into use in response to demands for a completion fluid that would have the advantages of an oil-base drilling fluid as far as productivities were concerned, but would not have the disadvantages normally associated with oil-base drilling fluids.

The disadvantages of oil-base drilling

fluids that operating personnel object to are:

1. Fire hazard.
2. Severe staining of clothing.
3. High cost.

Oil-base-emulsion drilling fluids are noninflammable, even though they are primarily oil.

A Cleveland open-cup flash point was run on a sample of an oil-base-emulsion drilling fluid containing 32 per cent water by volume. No true flash point was obtained, due to the suppressing effect of the water as it vaporized. The sample had a flash point at least above 300° F.

Color and cost good . . . Oil-base-emulsion drilling fluids are light tan in color and are compounded of refined oils. The light color eliminates the crew's natural aversion to oil. The lack of staining materials, such as are present in oil-base muds, makes the washing of dirty clothing much simpler.

Oil-base-emulsion drilling fluids sell for less than oil-base drilling fluids, due to the lowered makeup cost from using a high water content.

This light color of oil-base-emulsion drilling fluids is of distinct advantage when making displacement with crude oil to bring a well in. Visual observation is all that is necessary to determine where the drilling fluid stops and the oil starts.

Oil-base-emulsion drilling fluids may be used from well to well with only normal maintenance being required. They have an excellent storage life without deterioration.

Unique properties . . . Oil-base-emulsion drilling fluids, as initially formulated, had some unique properties:

1. No suspending ability.
2. No solids.

Along with these properties were the usual properties expected of an oil-base drilling fluid, namely:

1. Inertness to usual contaminants.
2. High completion productivities.
3. Ease of maintenance.
4. Light weight (when desired).

The properties of these early oil-base-emulsion drilling fluids in turn affected their performance and handling. These drilling fluids would drop their entrained cuttings immediately on stopping circulation or when the flow rate changed as in a flow line discharging into a mud ditch.

It is a common sight to see the ditch at the flow line filled to the brim with cuttings and no sign of settlings or cuttings at the far end of the settling ditch. Frequently when the flow rate is slow enough the flow line itself will fill up with cuttings.

This lack of suspending ability caused frequent complaints of hole fillup until drilling crews realized that it was necessary to circulate the hole clean prior to making a trip. Usually pumping until returns off bottom were received would be sufficient to insure no fillup.

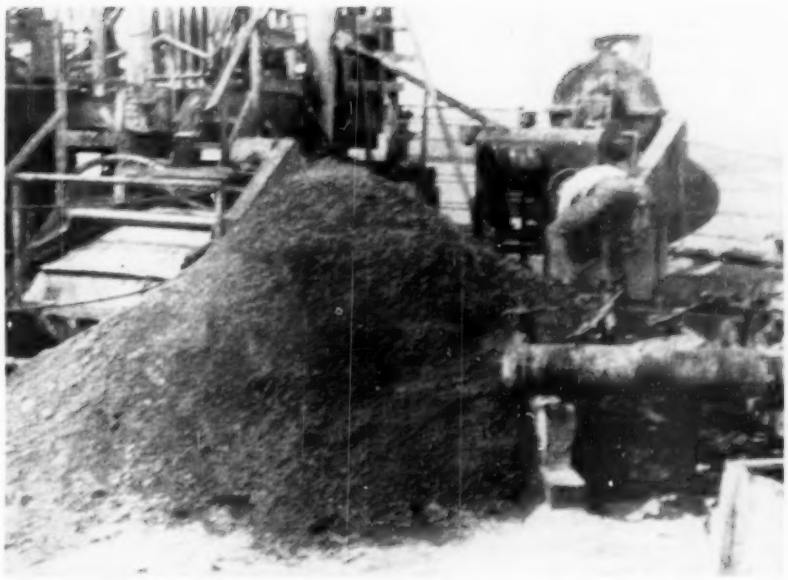


Fig. 3—Although the shale section being drilled inclines to make "mud," a good oil-base-emulsion fluid makes a pile like this.

Viscosity fixes loss . . . It has been noted that, in field use, the viscosity of the oil-base-emulsion drilling fluid directly influences the amount of drilling fluid lost to the formation. A mud loss amounting to 20 or more barrels per day can often be stopped completely by raising the viscosity appreciably.

The use of oil-base-emulsion drilling fluids in depleted or low-pressure fields has resulted in high productivities. These productivities are sufficiently high to justify, in many cases, the redrilling of older wells.

An added advantage in those low-pressure fields is that displacement with oil and placing the well on the pump is all that is necessary to bring the well in. Wells usually commence pumping at a high initial rate with no buildup encountered and remain at that rate with only normal decline.

THE AUTHOR

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Unconventional filtration . . . Along with the lack of suspending ability, the no-solids feature of these muds changes the usual concept of filtration behavior.

Conventional filter-loss testing[1] does not show up the difference, but running the filter loss on a sand bed, as described by Beeson and Wright,[2] reveals that the early oil-base-emulsion

TABLE 1—A TYPICAL EARLY OIL-BASE-EMULSION DRILLING FLUID ON SAND BED AT ROOM TEMPERATURE AND 100 PSI.

Sand bed number	1
Water permeability (md.)	80
Fluid loss (ml.):	
Mud spurt, visual	18.0
Mud spurt, graphed	29.0
1 minute	24.0
5 minutes	32.0
10 minutes	33.5
15 minutes	34.5
30 minutes	36.0
Cake thickness (32nds of an inch)	0

TABLE 2—TYPICAL PROPERTIES OIL-BASE-EMULSION DRILLING FLUIDS

Drilling fluid—	1	2	3
Viscosity:			
Marsh funnel, sec.	170	189	148
°F.	80	80	100
Shear strength, lb. per 100 sq. ft.:			
Initial	0	0	0
10 minutes	0	0	0
Fluid loss, A.P.I.:			
30 minutes	0	0	0
60 minutes	0	0	0
Character of filtrate when obtained	Clear oil	Clear oil	Clear oil
Mud weight, lb. per cu. ft.	59	60½	60

Note: The water contents of these drilling fluids range from 30 to 40 per cent by volume.

drilling fluids had a high spurt and did not form a visible mud cake.

The typical drilling fluid properties of the several oil-base-emulsion fluids are tabulated in Table 2.

Resistant to contaminants . . . Oil-base-emulsion drilling fluids are remarkably resistant to contaminants. The usual effect of contaminants on clay-water muds is reversed when the contaminants are dispersed in an oil-base-emulsion drilling fluid.

In Table 3 the effect of several ordinary contaminants is shown on an early oil-base-emulsion drilling fluid. The bentonite was used to simulate formation clays.

Return permeabilities . . . Several of these oil-base-emulsion drilling fluids have been tested in Los Angeles Basin cores for their effect on oil permeability.[3] All of these oil-base-emulsion drilling fluids have excellent return permeability curves as noted from the accompanying graph of a typical mud.

Hydration problem solved . . . During the early use of oil-base-emulsion drilling fluids, an occasional well would discharge into the mud stream a large amount of viscous clay-water mud. The amount would range from 10 to 50 bbl. or more. This slug of clay-water mud was usually encountered when cleaning out the pilot hole after prolonged wall scraping.

This "mud inflow" for some time was thought to be clay-water mud from certain earlier wells in the same area, which had severe lost-circulation problems. No positive identification could be made, although the "mud" properties were remarkably similar to the earlier drilling mud.

Later observations led to the suspicion that the shale sections were either being hydrated and washed and/or the shale cuttings were being hydrated rather than circulated out of the hole as cuttings.

Certain changes were made in formulating oil-base-emulsion drilling fluids to inhibit the hydration of shale. These improved emulsions have lost the property of no suspension of solids. These fluids can be carried at weights considerably above those previously attained. This suspending ability is attained without measurable gel strength.

TABLE 4—HYDRATION STUDY OF OIL-BASE-EMULSION DRILLING FLUIDS
(Water contents, per cent of original water content)

Oil-base-emulsion drilling fluid—	A	B	C	D
Drilling fluid layer from:				
Natural shale	97	82	57	6
Diatomaceous shale	100	74	*89	*85

*The emulsion was completely broken and gelled with hydrated shale.

Hydration tests . . . In an effort to evaluate this effect in the laboratory, the following test was devised:

The particular shale in question is obtained in its fresh state (or rehydrated) and crushed to obtain pieces minus ¾ in. and plus 10 mesh. This sizing was chosen to simulate scraper cutting sizes.

The crushed shale is added to the oil-base-emulsion drilling fluids at the concentration of 100 lb. per bbl. The samples are placed on bottle rollers in an oven. The rate of rolling used was 120 r.p.m. and the tests reported herein were run at 150° F.

(If a 12-in. hole were to be drilled through 100 ft. of pure shale, the cutting would amount to 36 lb. per bbl. in a 300-bbl. mud system.)

A more vigorous test was also devised which eliminates the need for fresh shale and which does not depend on the variability of shales. In this test, coarse, dry bentonite (Wyoming type) is screened to remove the minus 10 mesh fraction and the plus 10 mesh pieces are used in place of shale. This test is not representative of any field conditions and should be used only to determine the relative stability of the emulsions being tested.

Exaggerated conditions . . . This testing procedure is a drastic test that is not representative of normal drilling. The test is believed to be an exaggeration of conditions obtained when inadequate attention is paid to the following:

1. Adequate circulation rate to remove cuttings.
2. Circulation to remove cuttings prior to suspending circulation.
3. Accumulation of cuttings in surface mud system to the point where pump suction picks up cuttings and disperses them in the mud.
4. Proper viscosity control.
5. Condition of the emulsion.

It must be emphasized again that the shale hydration conditions exemplified in this section are exception and are primarily due to faulty handling. An accompanying photograph shows the type of shale cuttings normally obtained when proper attention is paid to all phases of use of these drilling fluids.

The author has seen similar large cuttings obtained from mud-making shales with each of the presently available commercial oil-base-emulsion drilling fluids.

Another photograph illustrates the magnitude of shale cuttings that are removed from the mud stream by the shale shaker when using a properly serviced oil-base-emulsion mud. The shale pile in this photograph is from a good mud-making shale.

Underlining these points . . . The results of extensive hydration tests brought out these points:

Fines from drilling tend to settle out of oil-base-emulsion drilling fluids fastest when they are in a partially hydrated state. When completely hydrated, they tend to become incorporated in the mud and if nonhydrated, the fines remain in a dispersed state.

The practical aspect of this observation is that those oil-base-emulsion drilling fluids, which do not hydrate shale appreciably in the lab tests, tend to accumulate fines from cuttings in a dispersed state in the field with attendant increase in weight.

Field observations indicate that where the mud weight is allowed to rise through the accumulation of partially hydrated cuttings, the well productivity is impaired somewhat. This is believed to be due to a cake containing partially hydrated cuttings, which are not oil dispersible.

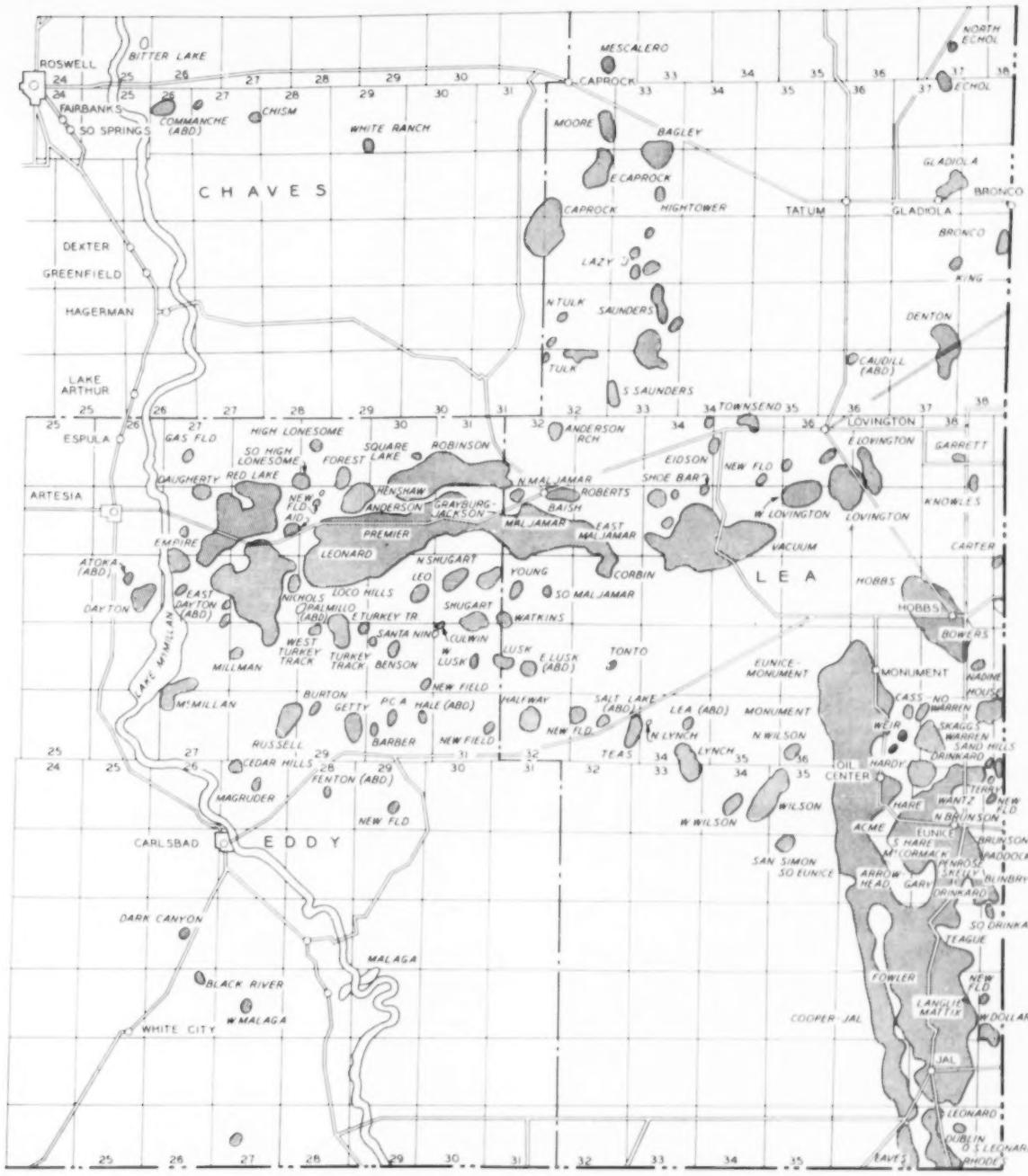
The net result of these factors is that where the oil-base-emulsion drilling fluid does not contain hydration inhibitors, closer attention must be paid to the removal of cuttings from the well bore and the surface system, whereas, the oil-base-emulsion drilling fluid that does contain hydration inhibitors required more service to keep the mud weight from climbing, due to the accumulation of dispersed partially hydrated cuttings.

TABLE 3—EFFECT OF CONTAMINANTS ROOM-TEMPERATURE TESTS ON A TYPICAL EARLY OIL-BASE-EMULSION DRILLING FLUID

	Blank	Bentonite			Cement		Fresh water		
Lb. per bbl. added		5	10	15	1	5	10	20	30
Viscosity, Stormer, cp.	32½	32.0	30½	21	28.9	28.5	32	39	46½
Shear strength, lb. per sq. ft.:									
Initial	0	0	0	0	0	0	0	0	0
10 minutes	0	0	0	0	0	0	0	0	0
Filter loss, A.P.I., ml.	0	0	0	4.0	0	0.4	0.1	0.2	0.4

References

1. A.P.I. Code 29, Third Edition, May 1950.
2. Beeson and Wright, "Loss of Mud Solids to Formation Pores," Pet. Eng., August 1952, B-40.
3. Wright, C. C., "Effect of Drilling Fluids on Productivity," A.I.M.E. fall meeting, Los Angeles, October 1951.



Oil fields of southeastern New Mexico. (Courtesy Midland Map Co., Midland, Tex.)

New Mexico's Oil and Gas Reserves

by R. R. Spurrier* and W. B. Macey,†
and staff of the New Mexico Oil Conservation Commission

THERE has been a notable increase in proven gas reserves in northwestern New Mexico since January 1, 1953. This increase has been due mainly to the extension of already existing gas fields in this area. The gas reserves in southeastern New Mexico have long been known to exist but it has only been recently that they have been fully developed. This has been due to the fact that additional pipe-line capacity has been installed, taking New Mexico's gas to outside markets.

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SUMMARY, OIL AND GAS RESERVES, STATE OF NEW MEXICO

Dry gas:	
Northwest New Mexico	11,170,739,000
Southeast New Mexico	4,133,557,000
Total	15,304,296,000
Associated gas:	
Northwest New Mexico	3,188,000
Southeast New Mexico	549,419,600
Total	552,607,600
Marketable associated gas:	
Total	367,714,200
Total gas reserve available for market	15,672,010,200
Oil:	
N.W. New Mexico (bbl.)	5,133,000
S.E. New Mexico (bbl.)	726,209,825
Total (bbl.)	731,342,825

Note: All gas reserve figures in M.c.f.

STATE OF NEW MEXICO DRY-GAS RESERVES

Northwest New Mexico

Producing zone—	Proven productive acreage	Estimated recoverable reserve
Pictured Cliff	284,475	1,544,741,000
Mesaverde:		
Cliff House	718,925	
Point Lookout	745,915	8,853,324,000
Dakota	17,440	54,882,000
Pennsylvanian	8,960	717,000,000
Undesignated		792,000
Total dry-gas reserves N.W. New Mexico		11,170,739,000

STATE OF NEW MEXICO DRY-GAS RESERVES

Southeast New Mexico

Pool and producing zone—	Proven productive acreage	Estimated recoverable reserve
Arrow:		
Yates and Seven Rivers	1,280	26,918,000
Queen	5,760	84,499,000
Blinebry:		
Blinebry	30,400	793,000,000
Eumont:		
Yates and Seven Rivers	30,240	508,939,000
Queen	43,360	636,091,000
Jalco:		
Yates and Seven Rivers	48,800	527,479,000
Justis:		
Glorieta	5,120	21,600,000
Langmat:		
Yates and Seven Rivers	46,720	982,522,000
Tubb:		
Tubb	32,160	552,509,000
Total dry-gas reserve S.E. New Mexico		4,133,557,000
Total dry-gas reserve State of New Mexico		15,304,296,000

Note: All gas reserve figures in M.c.f.

There has been approximately a 15 per cent increase in proved oil reserves since January 1, 1953. This increase has been due mainly to the discovery of new oil pools in this area. At present the oil outlet from the state is limited to a certain extent due to pipe-line capacity but additional capacity could be provided in a minimum amount of time.

The New Mexico Oil Conservation Commission has assembled and prepared its own reserves based upon electric logs, core analyses, and reports of its own engineers, geologists, and field inspectors.

Information compiled by various oil and gas companies or federal agencies has been considered academically. However, the views and conclusions used are those based on the experience of the New Mexico Oil Conservation Commission staff and used in their own work, regardless of conclusions of others.

Oil Reserves, Field by Field, in New Mexico

NORTHWEST NEW MEXICO

Pool—	Proven productive acreage	Recoverable reserves— Oil	Recoverable reserves— Associated gas
McKinley County:			
Hospah	3,240	366,000	(†)
Red Mountain	160	8,000	(†)
Rio Arriba County:			
Lindrith-South Blanco-Tocito	3,360	3,699,000	3,188,000
San Juan County:			
Hogback-Dakota	280	840,000	(†)
Rattlesnake-Dakota	680	76,000	(†)
Table Mesa	280	144,000	(†)
Total reserve Northwest New Mexico		5,133,000	3,188,000

†Associated gas reserve insignificant.

SOUTHEAST NEW MEXICO

Pool—	Proven productive acreage	Recoverable reserves— Oil	Recoverable reserves— Associated gas
Acme	40	400	(†)
Aid	240	8,500	(†)
Anderson	2,000	580,000	453,000
Anderson Ranch Devonian	1,000	24,925,000	5,530,000
Anderson Ranch Wolfcamp	800	5,995,000	9,670,000
Arrowhead	5,280	1,600,000	*768,000
Artesia	9,000	2,830,000	2,550,000
Bagley Pennsylvanian	1,840	4,000,000	*9,986,000
Bagley Siluro-Devonian (80)	1,600	29,000,000	928,000
Baish	320	240,000	*213,500
Barber	520	328,000	98,000

SOUTHEAST NEW MEXICO (Continued)

Pool—	Proven productive acreage	Recoverable reserves— Oil	Recoverable reserves— Associated gas
Benson	240	324,000	98,000
Black River	160	34,400	13,700
Blinebry	640	400,000	*1,920,000
Bluit San Andres	80	16,500	(†)
Bough	1,360	2,600,000	4,060,000
Bowers	3,960	1,700,000	*2,930,000
Bronco Siluro-Devonian	320	7,820,000	1,200,000
Brunson	7,080	44,400,000	*50,300,000
Caprock	6,400	3,600,000	1,300,000
Caprock, East Devonian	920	6,929,000	152,500
Caprock, East Pennsylvanian	40	25,000	50,000
Caprock, East Wolfcamp	300	220,000	286,000
Carter San Andres	40	2,000	(†)
Cary	120	290,000	306,000
Cass	240	2,400,000	*470,000
Caudill Pennsylvanian	40	2,000	(†)
Cedar Hills	240	159,000	23,800
Chisum	80	350,000	22,600
Chisum San Andres	120	49,000	72,800
Cooper Jal	12,630	13,500,000	*6,470,000
Corbin	440	280,000	78,000
Corbin Yates	40	2,600	(†)
Crossroads	920	6,600,000	185,000
Crossroads Pennsylvanian	760	1,782,000	2,830,000
Dark Canyon	40	12,800	(†)
Daugherty	80	11,400	(†)
Dayton	800	49,425	29,500
Denton	3,280	54,600,000	61,000,000
Denton Wolfcamp	2,640	7,500,000	*2,620,000
Dollarhide Devonian	600	1,400,000	*1,760,000
Dollarhide Drinkard	1,500	5,100,000	*6,330,000
Dollarhide Ellenburger	500	1,150,000	*560,000

SOUTHEAST NEW MEXICO (Continued)

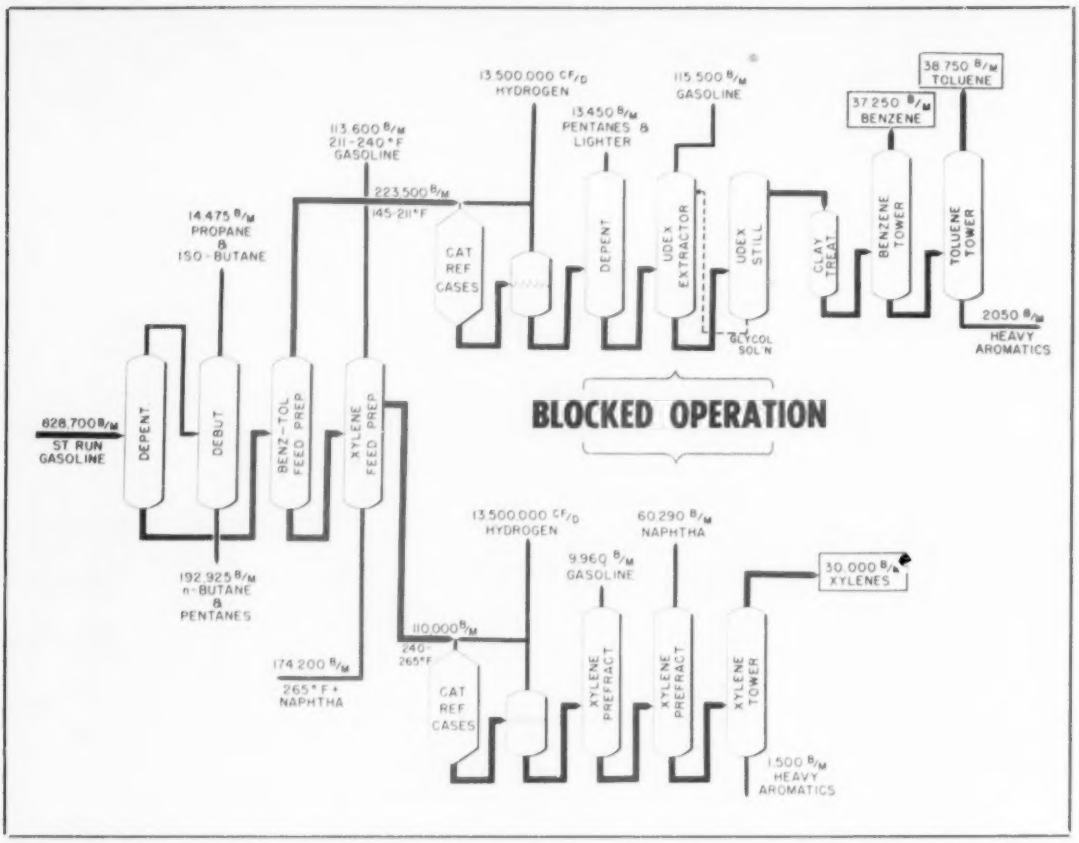
Pool—	Proven productive acreage	Recoverable reserves— Oil	Associated gas
Dollarhide Fusselman	280	800,000	*610,000
Dollarhide, Queen	1,040	2,900,000	*1,220,000
Drinkard	25,760	31,200,000	*36,900,000
Drinkard, South	120	10,000	*15,500
Dublin Devonian	40	8,500	(†)
Eaves	2,000	6,200,000	(‡)
Echol (Devonian)	240	2,200,000	110,000
Echol (Devonian North)	80	39,000	25,400
Eidson Pennsylvanian	320	1,320,000	1,900,000
Empire	2,960	181,400	72,500
Eunice-Monument	41,440	105,800,000	*45,600,000
Monument Blinebry	1,180	2,300,000	*1,690,000
Monument Paddock	360	845,000	*1,270,000
Eunice, South	6,360	6,900,000	*3,240,000
Forest	760	388,600	271,000
Fowler (80)	960	3,900,000	*3,660,000
Fren	4,280	2,192,800	1,530,000
Garrett	120	21,000	(†)
Getty	400	452,700	67,900
Gladiola	440	2,800,000	435,000
Gladiola Wolfcamp	700	2,600,000	2,700,000
Glenn-Castile	40	3,000	(†)
Grayburg-Jackson	15,960	18,381,000	*19,100,000
Grayburg-Keeley	240	149,600	*131,000
Halfway	400	260,000	85,500
Hardy	1,600	210,000	*75,500
Hare	3,840	21,700,000	*46,800,000
Hare, South	160	21,000	*21,000
High Lonesome	160	16,200	(†)
Hightower	240	330,000	*127,000
Hightower Permo Penn.	160	277,000	*1,245,000
Hobbs	10,760	53,000,000	*29,200,000
Hobbs, Drinkard	40	13,300	*17,300
Hobbs, East Blinebry	40	20,000	*21,000
Hobbs, East San Andres	760	6,100,000	*2,990,000
Hobbs, East Seven Rivers	40	140,600	*105,200
House	360	740,000	961,000
House San Andres	580	175,000	94,500
King Wolfcamp	40	259,000	185,000
Knowles	600	2,250,000	373,000
Langlie Mattix	28,000	15,430,000	*10,350,000
Lazy J	360	780,000	*1,075,000
Leo	280	49,200	34,500
Leonard	120	23,600	*15,300
Leonard, South	640	426,000	*320,000
Lightcap	80	26,000	260,000
Loco Hills	10,080	8,210,000	*6,150,000
Loco Hills (Queen)	40	6,000	*4,800
Lovington	2,400	3,700,000	1,885,000
Lovington Abo	1,640	5,920,000	2,435,000
Lovington, East (Penn.)	240	650,000	710,000
Lovington, Paddock	1,600	4,500,000	2,235,000
Lovington, West	2,560	4,000,000	2,040,000
Lovington, Wolfcamp	160	600,000	763,000
Lusk	200	26,000	13,000
Lusk, West	80	3,900	(†)
Lynch	960	2,200,000	220,000
Lynch, North	40	31,000	31,000
Malaga	880	697,900	279,000
Maljamar	11,360	24,400,000	*34,500,000
Maljamar Devonian	40	160,000	8,000
Maljamar, East	40	22,000	22,000
Maljamar, North	200	69,200	69,200
Maljamar, Paddock	120	330,000	*429,000
Maljamar, South	40	15,000	15,000
McCormack	80	142,000	198,000
McMillan	360	330,000	33,000
McMillan, Seven Rivers	80	7,600	(†)
Mescalero Devonian	240	3,100,000	155,000
Mescalero Pennsylvanian	240	1,100,000	860,000
Millman (Grayburg)	40	2,000	(†)
Moore, Devonian	600	2,500,000	125,000
Moore, Pennsylvanian	120	108,000	75,500
Nadine	120	37,000	40,700
Nichols	360	135,500	*108,000
Paddock	6,640	10,400,000	*9,789,000
P.C.A.	360	100,000	20,000
Pearsall	880	526,000	268,000
Penrose-Skelly	16,680	4,600,000	*3,450,000
Premier	2,560	781,000	*625,000
Red Lake	4,840	1,640,000	1,150,000

SOUTHEAST NEW MEXICO (Continued)

Pool—	Proven productive acreage	Recoverable reserves— Oil	Associated gas
Rhodes	2,360	775,000	*504,000
Roberts	1,920	850,000	466,000
Robinson	1,280	841,000	590,000
Russell	680	482,000	193,000
Sandhills	80	6,000	(†)
San Simon	80	44,000	(†)
Santo Nino	120	15,000	(†)
Saunders	2,840	19,600,000	*28,800,000
Saunders, South	120	76,700	*99,000
Sawyer	80	32,600	29,400
Shugart	440	521,000	312,000
Shugart, North	1,520	381,000	260,000
Skaggs	2,440	4,890,000	*5,000,000
Square Lake	9,680	5,630,000	4,400,000
Teague	480	1,680,000	*1,320,000
Teague, Devonian	120	388,000	*310,000
Teague, Ellenburger	480	3,300,000	*3,620,000
Teas	160	54,000	27,000
Terry Blinebry	360	370,000	*815,000
Tonto	80	141,400	31,000
Townsend Wolfcamp	400	319,000	376,000
Tulk Wolfcamp	840	1,920,000	*2,205,000
Turkey Track	640	203,000	61,000
Turkey Track, East	120	44,100	17,600
Turkey Track, Seven Rivers	440	25,000	8,000
Turkey Track, West	120	2,000	(†)
Twin Lakes	40	4,000	(†)
Vacuum	18,240	59,300,000	*31,800,000
Wantz Abo	600	1,660,000	*2,840,000
Warren Drinkard	240	117,000	*170,000
Warren McKee	600	3,940,000	*2,380,000
Warren McKee, North	800	3,000,000	*1,740,000
Watkins	320	45,000	33,700
Watkins Grayburg	40	28,800	28,800
Weir	40	31,000	*42,500
White Ranch Siluro-Dev.	80	1,960,000	345,000
Wilson	2,080	4,906,000	1,240,000
Wilson, North	40	23,600	5,900
Wilson, West	400	489,000	171,000
Young	240	405,000	304,000
Total reserve, S.E. New Mexico		726,209,825	549,419,600
Total reserve, State of New Mexico		731,342,825	552,607,600
Marketable associated gas			367,714,200

*Marketable gas reserve. †Associated gas reserve insignificant. ‡Gas reserve computed elsewhere.

TYPICAL DRILLING SCENE on deep Ellenburger test in Lea County, New Mexico.



MAKING B.T.X. . . . Sun Oil Co. aromatics plant operation at Marcus Hook, Pa., charges over 27,000 bbl. per day of straightrun gasoline fraction. (Note that quantities on this flowsheet are in barrels per month.) Blocked operation is employed to make: (1) benzene and toluene, (2) mixed xylenes, and (3) upgrade low-octane naphtha for blending into motor fuel.

53 Million Gallons of B.T.X. Annually

. . . Capacity of Sun's $15,000,000 Marcus Hook refinery

by John C. Reidel
Petrochemical Editor

SUN Oil Co. now has in operation a $15,000,000 plant, located at its 145,000-bbl. per day refinery at Marcus Hook, Pa., for making benzene, toluene and xylenes from a naphthenic concentrate utilizing Houdriforming and Udex processes.

Design capacity of the new plant is 19,000,000 gal. each of benzene and toluene and 15,000,000 gal. of mixed xylenes. The total capacity of aromatics of this plant represents between 10 and 15 per cent of total United States capacity of petroleum-derived benzene, toluene and xylenes. *(The Oil and Gas Journal, December 14, 1953, page 84).* Production of these basic aromatics from the one plant will equal one-fourth of their total production by the entire coal-tar industry in 1941.

Blocked-out operation . . . The plant is designed to: (1) make benzene and toluene, (2) produce xylene, and (3) operate for motor-gasoline production, these three functions being conducted in blocked-out operation. The Sun processing therefore differs from the Platformer-Udex operation such as conducted by Cosden Petroleum Co. at Big Spring, Tex. *(The Oil and Gas Journal, January 4, page 72)* in which benzene, toluene, and xylene are produced simultaneously. In xylene operation at the Sun plant the mixed xylenes are recovered by fractionation rather than solvent extraction.

Sun Oil, already a major producer of propylene trimer and tetramer, petroleum sulfonates, and a high-molecular-weight naphthenic acid, also has plans for other petrochemical ventures. Such plans include possibility of building a large ethylene plant when market conditions are right, and utilization of the more than 13,000,000 cu. ft. per day of byproduct hydrogen from the Houdriformer operation (Fig. 1).

Making Benzene and Toluene

The continuous processing incorporates these four basic steps: (1) feed preparation (2) catalytic reforming, (3) aromatics recovery and (4) aromatics separation by superfractionation. Employment of Udex extraction and su-

perfractionation results in high-purity benzene and toluene.

Feed preparation . . . Over 800,000 bbl. per month (some 27,000 bbl. per day) of straightrun gasoline, part of which may be casing-head gasoline, is fed to the prefractionation section of the plant. Here the straightrun gasoline is distilled in superfractionators into a number of closely cut streams to prepare feed stocks for the main part of the plant. The first tower depentanizes the gasoline. The overhead from this tower is further split in the second tower into an isobutane and lighter cut, and a normal butane-pentane fraction.

The bottoms from the depentanizer go to the third superfractionator where the feed stock for the manufacture of benzene and toluene is distilled overhead. This 211°-240° F. fraction stream contains a small amount of naturally occurring benzene and toluene and such naphthenes as cyclohexane, methylcyclopentane, methylcyclohexane, and dimethylcyclopentanes.

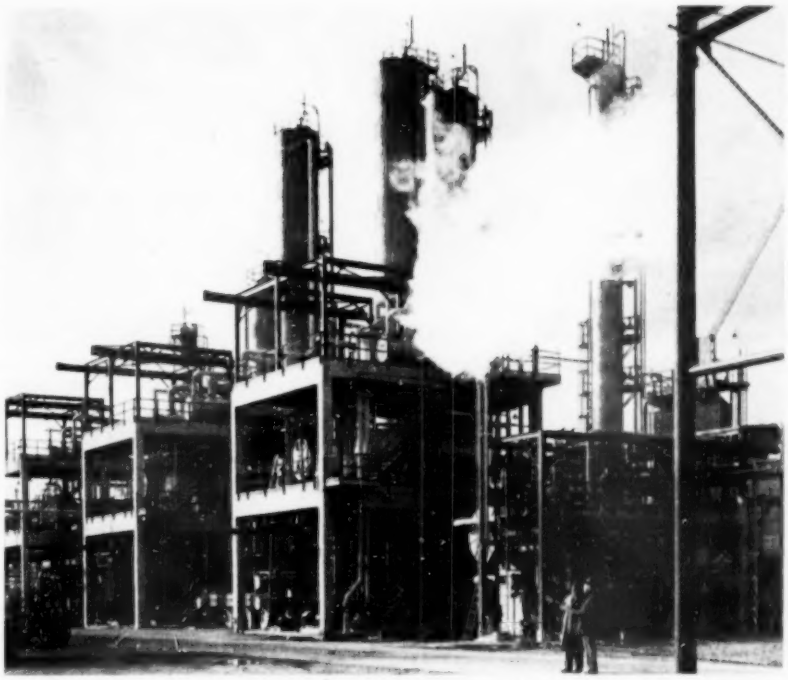
Houdriforming . . . The naphthene concentrate is charged to the Houdriformer unit which reforms naphthenes to aromatics over a platinum catalyst. This being a relatively large cat reforming plant there are four pairs of cases with a furnace before each case.

The catalyst operates in the presence of hydrogen and at over 900° F. and 300 psi. pressure to convert the cyclohexane and methylcyclopentane into benzene and hydrogen. The methylcyclohexane and dimethylcyclopentanes are converted to toluene and still more hydrogen.

Over 13,000,000 cu. ft. per day of high-purity hydrogen is produced as a valuable byproduct. Actually the hydrogen is withdrawn from a stream of hydrogen which is continuously recycled to the catalyst cases to prevent deactivation of the catalyst. By this means the need for regeneration of the catalyst is minimized and the unit is kept on-stream for long periods.

Udex extraction . . . After separation of hydrogen, the liquid product from the catalytic reforming cases is depentanized. The bottoms from the depentanizer, while rich in benzene and toluene, still must be further processed in the Udex unit.

The Udex unit consists fundamentally of two towers or columns. In the first the benzene-toluene rich stream flows countercurrently to a diethylene glycol solution. The glycol solution extracts the benzene and toluene from the contaminating hydrocarbons. In the second tower of the Udex unit the benzene and toluene are stripped from the glycol by distillation. The glycol is then pumped back to the extraction tower for reuse.



PREFRACTIONATION . . . Feed is prepared here before charging to Houdriformer cases. This is part of Sun Oil Co.'s new $15,000,000 petrochemical plant at Marcus Hook, Pa. Capacity of this one plant is equal to 6 per cent of total United States output of benzene, 8 per cent of total output of toluene, and 12 per cent of total output of xylenes.

Superfractionation . . . The product from the Udex unit consists of a mixture of high-purity benzene and toluene but still contains slight traces of certain undesirable materials. Clay treaters are used as a final cleanup step. The clay polymerizes the undesirable constituents into material boiling higher than either benzene or toluene.

The purified aromatics then pass through two more distillation columns. From the first, nitration-grade benzene is recovered and from the second, nitration-grade toluene.

Making Xylenes

Returning to the prefractionation section, the bottoms from the benzene-toluene tower flows to a xylene feed-preparation column. Here a so-called "heart cut" is taken from the tower as a side stream.

This side stream is rich in the hydrocarbons that will produce xylenes. It contains naphthenes such as ECH (ethylcyclohexane), DMCH (dimethylcyclohexane), and TMCP (trimethylcyclopentane).

The operation of the Houdriformer on the xylene feed is similar to that on the benzene-toluene feed. The principal difference is a higher pressure—around 500 psi. Again over 13,000,000 cu. ft. per day of hydrogen is produced.

The liquid product from the catalytic reformer is fed to two distillation towers in series. The first recovers a light gasoline, the second a naphtha stream. A third tower separates the final xylene product from a small amount of higher-boiling aromatics produced in the operation.

The reason xylenes can be recovered by careful fractionation instead of by solvent extraction is explained as follows. The feed to the Houdriformer is deliberately cut so that it contains virtually nothing boiling above 265° F. Since the lowest boiling xylene boils about 277° F., it is possible to fractionate the xylenes formed in the operation from the unconverted portion of the feed.

The term "xylenes" has been used loosely to cover the four aromatic compounds: Ethylbenzene, orthoxylene metaxylene, and paraxylene. In combination the principal use for the xylenes is as a solvent. Separated, these four materials hold wide interest in the petrochemical field.

Ethylbenzene is the starting material for styrene used extensively in synthetic rubber, plastics, and paints. Orthoxylene can be used in place of naphthalene in the manufacture of phthalic

CONTROL ROOM . . . Sun Oil Co.'s new aromatics plant. Chemicals the plant produces have essential uses in making synthetic rubber, plastics, textile fibers, explosives, insecticides, solvents, and hundreds of other products.

anhydride. Metaxylene is beginning to have commercial importance as a source of isophthalic acid and paraxylene already is well known as a starting material for du Pont's synthetic fiber, Dacron.

Cat Reforming is Flexible

Actually the plant was designed to have a high degree of flexibility to vary widely the relative proportions of the benzene, toluene, and xylenes, depending on market demand. Interest in cat reforming is the fact that it can be used for upgrading low-octane naphthas for blending into motor gasoline or for production of aviation-gasoline blending stocks.

The design charge rates for the three different blocked-out operations are:

	Bbl. per stream day
Benzene-toluene operation	11,500
Xylene operation	13,200
Motor-gasoline operation	14,400

As noted, the virgin naphtha charge stock is fractionated in the feed-preparation section into the proper boiling-range cuts required for the desired type of operation. This prepared charge stock is pumped from storage and combined with a hydrogen-rich recycle gas separated from the reactor effluent. The combined feed stream is preheated by heat exchange with the effluent from the final reforming reactor before it is brought up to the reaction temperature in the fired preheater furnace.

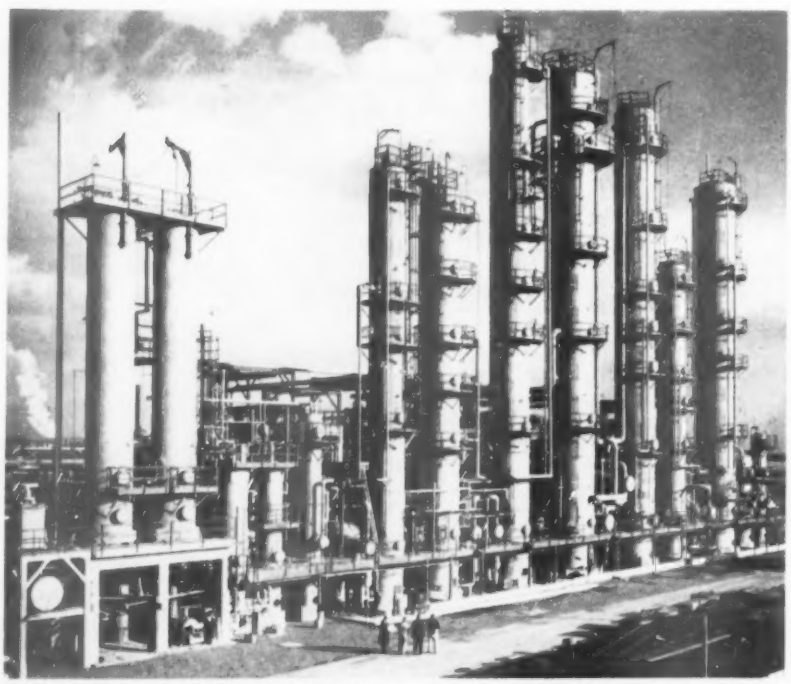
Parallel streams . . . As a result of the endothermic nature of the reaction, the reactants are cooled in passing through the fixed-bed catalytic reactors. There are a total of eight reactors arranged for parallel processing of two streams, each of which passes four reactors in series, with reheater furnaces provided between each set of reactors in series to bring the reactants up to the desired reaction temperature before passing into the next set of reactors.

The effluent from the last set of reactors is partially cooled and condensed by exchange with the charge streams and finally by water-cooled condensers. The resultant vapor-plus-liquid is separated by flashing into a high-pressure separator drum. The vapors from this drum are rich in hydrogen and the greater portion of this stream is recycled to the reactors as previously described. The remaining high-pressure vapor, consisting largely of C_2 and lighter produced during the reforming reaction, flows to the gas-recovery system where all C_3 and heavier material is removed before this stream goes to the refinery fuel system. The liquid from this separator drum is charged to the stabilizer section of the unit.

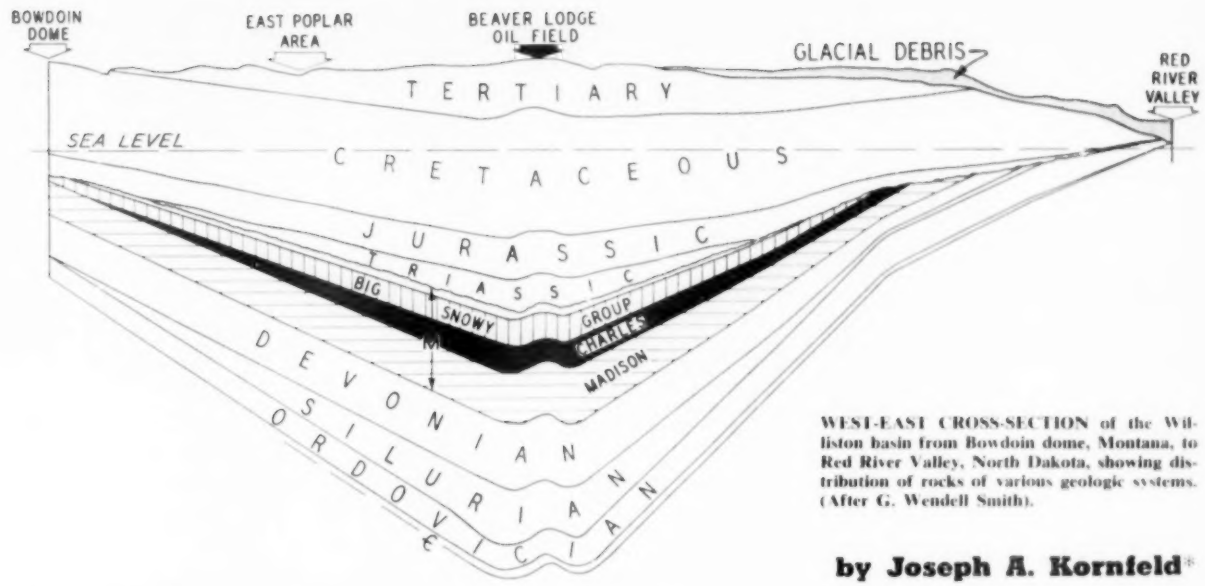
When operating for the production of aromatics, the stabilized liquid from the stabilizer tower will be the charge stock for an aromatic recovery plant presently under construction. On motor-gasoline operation, the stabilized liquid will be used as motor-gasoline blending stock.

The plant is quite flexible in design. Not only is it designed to operate for three different types of operations varying from 300 to 700 psig., but the exchangers, heaters, and reactors are arranged in parallel so that one half of the plant can be operated at a time.

Houdriforming, developed by Houdry Process Corp., was adapted with the help of Sun engineers to the manufacture of aromatics. Udex is a Dow Chemical Co.-Universal Oil Products Co. process which is licensed by the latter company.



EXTRACTION SECTION . . . Includes Udex unit for recovery of benzene and toluene in blocked-out operation at Sun Oil Co. aromatics plant.



WEST-EAST CROSS-SECTION of the Williston basin from Bowdoin dome, Montana, to Red River Valley, North Dakota, showing distribution of rocks of various geologic systems. (After G. Wendell Smith).

by Joseph A. Kornfeld*

PROPER MUD PROGRAMS

. . . solve difficult drilling problems in Beaver Lodge field

SLOUGHING shales in Cretaceous rocks, as well as penetration of massive gypsum, salt, and lost-circulation zones in pre-Cretaceous formations pose real operating problems to drilling contractors operating in Beaver Lodge oil field of northwestern North Dakota in the heart of the Williston basin.

Mud-program design currently employed in development of Beaver Lodge field is generally divided into the following arrangement

1. **Surface hole**—glacial drift and Teritary rocks (0 to 600 ft.).

2. **Below surface** pipe to top of Spearfish formation (600 to 5,900 ft.).

3. **Top of Spearfish** to Mission Canyon reservoir (5,900 to 8,700 ft., total depth.)

Surface Hole: Glacial Drift

Surface hole in glacial drift and Tertiary rocks is cut using a spud mud prepared with water and water-based gel. Surface casing is generally set at 600 ft.

Tertiary and Mesozoic

Rocks of Tertiary and Mesozoic age are cut in drilling below surface pipe to top of Triassic Spearfish found at about 5,900 ft. A native mud is used to drill this section of hole which is predominantly shale.

Large amounts of water are required each day to overcome buildup of native solids in the mud which occurs throughout the Cretaceous section. Mud weights are maintained at 10.0 lb. per gallon. As an aid in reducing the amount of water required to control mud weight and viscosity in the upper part of the hole, special mud additives are used to thin the mud and produce greater settling of the native shale solids in the pits.

Triassic and Mississippian

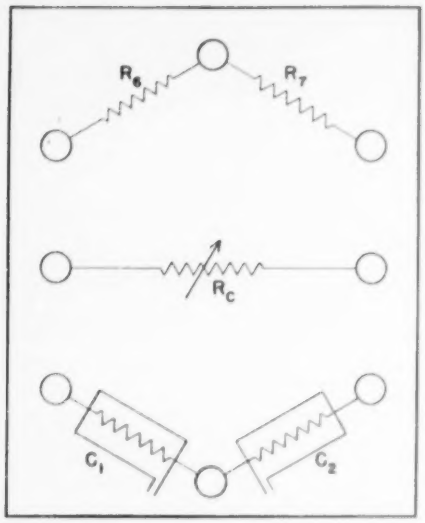
Mud system is converted to a gypsum-base mud at the top of the Spearfish formation. Triassic Spearfish and

(Continued on page 103)

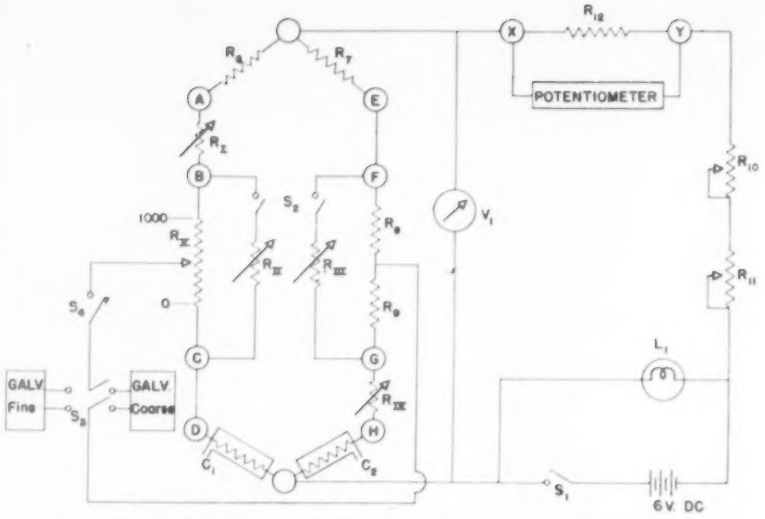
TYPICAL MUD PROPERTIES OF RECENT WELL COMPLETIONS IN BEAVER LODGE OIL FIELD, NORTH DAKOTA TRIASSIC AND MISSISSIPPIAN ROCKS

Well A—(Total depth—8,539 ft.)					
Depth, ft.	5924	6720	7454	8290	8539
Weight, lb./gal.	9.6	10.5	10.4	10.5	10.8
Viscosity (funnel), secs. A.P.I.	36	48	42	50	54
Initial gel, g. (Stormer)	15	40	30	30	15
10-min. gel, g. (Stormer)	15	40	30	40	25
Filter loss, cc. A.P.I.	10.4	10.0	13.5	15.6	10.2
pH	8.0	6.5	7.0	6.5	6.5
Salt—p.p.m.	Nil	7,500	7,500	240,000	264,000
Preservative, lb./bbl.	0.35	0.30	0.30	0.20	0.50
Converted to gyp-base mud at 5,865 ft.					
Well B—(Total depth—8,600 ft.)					
Depth, ft.	6100	7078	7930	8457	8522
Weight, lb./gal.	9.3	9.9	9.9	10.3	10.4
Viscosity (funnel), secs. A.P.I.	43	45	47	51	45
Initial gel, g. (Stormer)	20	40	35	15	15
10-min. gel, g. (Stormer)	20	40	40	35	30
Filter loss, cc. A.P.I.	13.5	8.1	10.0	10.4	6.6
pH	8.0	7.1	7.0	6.5	6.5
Salt—p.p.m.	—	66,000	140,250	220,000	210,000
Preservative—lb./bbl.	0.25	4.35	0.30	0.25	0.25
Converted to gyp-base mud at 5,923 ft.					
Well C—(Total depth—8,725 ft.)					
Depth, ft.	6390	7004	7632	8341	8661
Weight, lb./gal.	9.6	10.1	10.2	10.3	10.3
Viscosity, (funnel), secs. A.P.I.	37	50	47	52	56
Initial gel, g. (Stormer)	15	40	40	40	20
10-min. gel, g. (Stromer)	20	40	45	40	30
Filter loss, cc. A.P.I.	22.0	13.6	11.6	13.5	10.8
Preservative, lb./bbl.	0.15	0.25	0.40	0.20	0.25
Converted to gyp-mud at 5,942 ft. Crude oil added to mud at 8,160 ft.					
pH	7.5	6.5	7.0	6.5	6.5
Salt—p.p.m.	16,500	60,000	65,000	190,000	201,000

*Petroleum consultant, Tulsa.



SCHEMATIC DIAGRAM of Veco Type 142 thermal-conductivity cell. Fig. 1.



SCHEMATIC DIAGRAM of electrical circuit of Veco Type 142 thermal conductivity cell. Fig. 2.

Many detailed, time-consuming analyses are required on the various streams in hydrocarbon processing operations. In particular these analyses are required when handling streams containing gaseous constituents and L.P.G. The method of analysis described here cannot in its present state of development be substituted for the tried and proved, but time-consuming, methods currently in use. However, it is felt that further work along these lines may lead to the development of a rapid, accurate analytical method which could result in increased quality of product and decreased operating costs.

Gas Analysis by THERMAL CONDUCTIVITY

. . . using the Thermistor, new electrical resistor

by Fred S. McDonald* and Kenneth A. Kobe†

THE thermal-conductivity method of gas analysis, based on a thermally sensitive electrical resistance, has been employed in a diversity of applications.[1,2,3] Traditionally, the electrical sensing element employed has been some form of wire, usually platinum.

Recently a type of electrical resistor, composed of a mixture of metallic oxides and sulfides, and having an extremely high negative temperature coefficient of resistance, has been taken from the class of a laboratory curiosity and perfected as a stable electrical-circuit component. These semiconduc-

*Dow Chemical Co., Freeport, Tex. †Department of Chemical Engineering, University of Texas, Austin.

How Thermal Conductivity Method Works

IF a constant electromotive force is applied to a wire surrounded by a gas contained in a chamber whose walls are maintained at a constant temperature, the temperature of the wire will rise until an equilibrium is reached. The thermal energy dissipated will then equal the electrical energy supplied to the wire. This energy will be dissipated by radiation, by convection, by conduction through the end connections, and by conduction through the gas.

If the temperature of the wire does not exceed 400° C., the amount of radiation is negligible. The amount of energy dissipated by convection will be negligible if the distance between the wire and the cell wall does not exceed 5 mm. If the end connections are constructed in such a manner as to make heat conduction through them negligible, then the equilibrium temperature of the wire will depend primarily on the thermal conductivity of the surrounding gas.

By using a wire which has a high-temperature coefficient of resistance, the magnitude of the resistance becomes indirectly related to the thermal conductivity of the gas.

Since the thermal conductivity of a binary gas mixture at any temperature and pressure fixes its composition, these principles may be incorporated into an analytical method employing an electrical measurement and an empirical calibration. It is not necessary that the gas be a true binary, and one or both of the bases may be mixtures, provided compositions are constant, or very nearly so.

To facilitate the electrical measurement, the sensing element is customarily incorporated into a Wheatstone bridge circuit, and the electrical measurement is primarily dependent on the ratio of the thermal conductivity of the gas analyzed to that of the reference gas.

If the bridge is brought to balance at each operation, the calibration curve will show the slide-wire reading as a function of composition.

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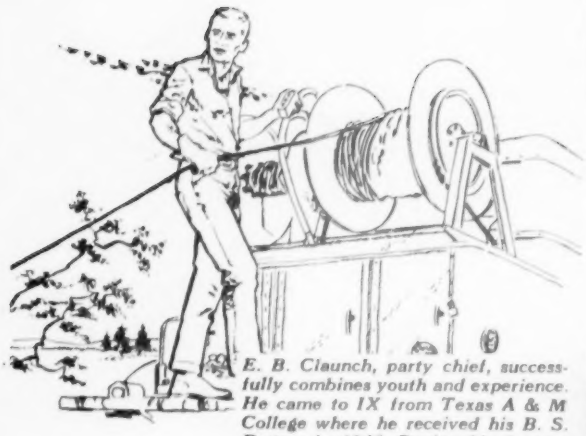

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tors are known by various trade names, the Western Electric Co. variety being called Thermistors.

An analytical unit employing a Thermistor as a sensing element has been built and operated successfully. The system was calibrated for the system methane-isobutane, and effects of operating variables were determined.

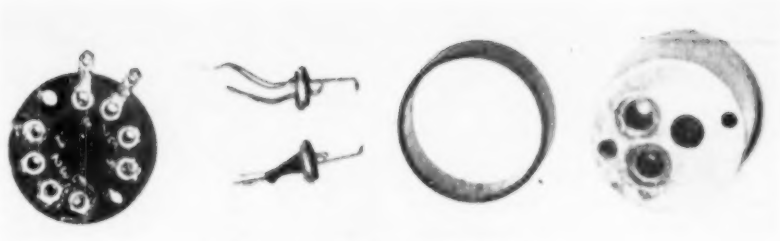
Advantages and Limitations

Advantages of the apparatus include (1) high sensitivity, (2) rapid analysis, (3) does not require skilled operator, (4) no computation involved, (5) is nondestructive of the gas measured, (6) requires only a very small gas sample which can be returned to the system, (7) is well suited for continuous indication, (8) can easily be made to operate process-control devices, (9) is independent of minor pressure variations, and (10) is rugged in construction.

Limitations are (1) method is never specific for any one gas, (2) empirical calibration is necessary for each system, and (3) in general, method is only good for binary mixtures or "pseudobinary mixtures." **Analysis of complex mixtures requires combination with partial physical separations or chemical reactions.**

General Design Considerations

Design of the electrical circuit and auxiliary equipment was based on these requirements for the equipment: (1) a Wheatstone bridge-type electrical circuit, operating on balanced bridge principle, with two legs formed by Thermistors, one surrounded by the gas to be analyzed, and one surrounded by a reference gas; (2) a specific means of attaining bridge balance, to give only one reading at a given gas composition; (3) a satisfactory spread in bridge balance indications of the individual gases, to provide required sensitivity; (4) equal resistance on both sides of the bridge; (5) constant bridge current; and (6) constant cell block temperature.



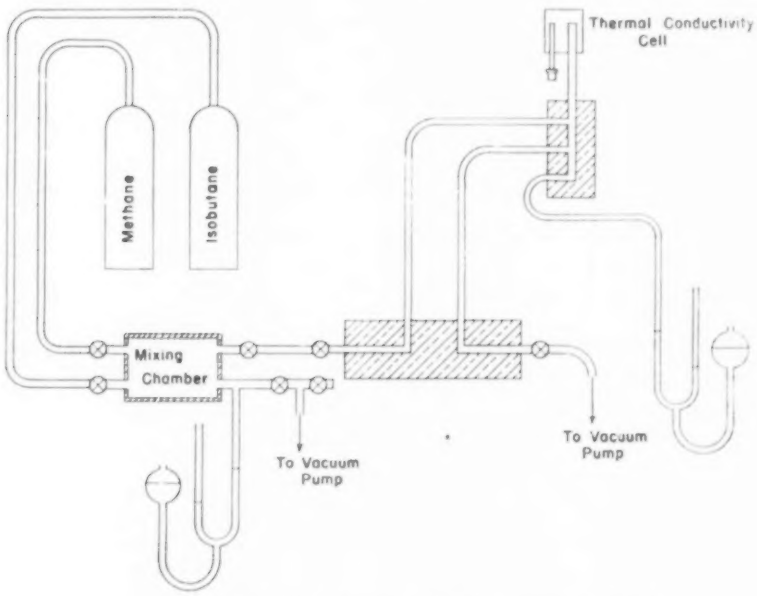
DISMANTLED thermal conductivity cell.

Electrical circuit . . . Although the electrical circuits utilized in the thermal conductivity method of gas analysis are essentially the same, their details vary with the designer and application. A schematic diagram of the electrical circuit devised for this equipment is shown in Fig. 2.

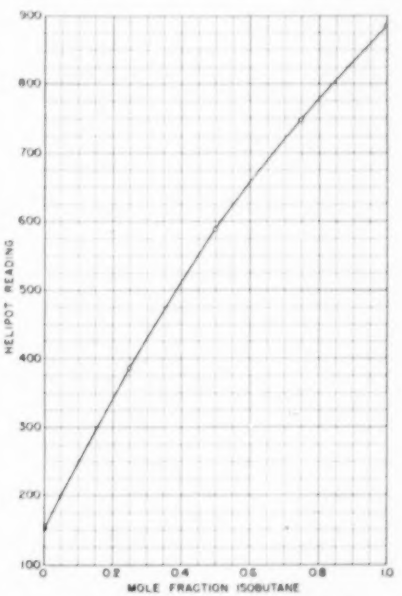
The starting point for the circuit design was a commercial thermal conductivity cell manufactured by Victory Engineering Corp. and designated as Veco Cell Type 142. Fig. 1 is a schematic diagram of the cell. A slide wire was connected between R_6 and C_1 to afford a means of obtaining bridge balance, and two fixed resistors R_8 and R_9 of equal value, with a combined resistance equivalent to the total resistance of the slide wire, were connected between R_7 and C_2 to maintain bridge symmetry.

The type of slide wire chosen was a Helipot because of its compactness, ease of adjustment, and high accuracy. The resistance of the slide wire chosen was 200 ohms which value was selected after considering the values of the resistors already in the bridge. The slide-wire resistance should be large enough with respect to the other resistors to permit balancing the bridge with each of the individual gases, yet small enough to provide considerably different balance points for the two individual gases.

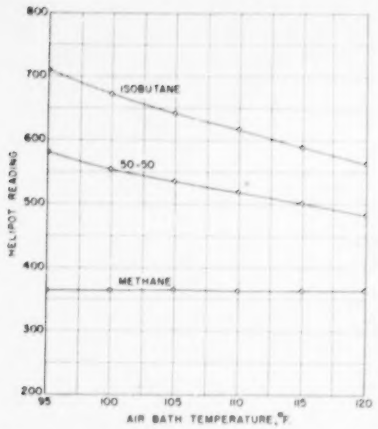
Since the optimum value of slide-wire resistance can only be arrived at by making some trial runs with the individual gases being considered, it is necessary to be able to increase or decrease the spread in slide-wire divisions between the balance points corresponding to the individual gases. A means of moving a balance point up or down on the slide wire must also be provided. These requirements were met, without violating bridge symmetry, by



FLOW DIAGRAM of thermal conductivity apparatus. Fig. 3.



CALIBRATION CURVE for methane-isobutane system. Fig. 4.



EFFECT OF air-bath temperature on bridge balance. Fig. 5.

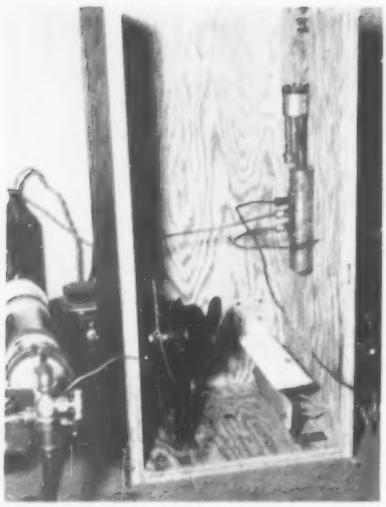
providing terminals A through H and variable resistors R_1, R_2, R_3, R_4.

A 6-volt storage battery was selected as a power supply. A d.c. voltmeter was connected across the bridge and two rheostats connected in the line provided coarse and fine voltage adjustments.

As a means of maintaining constant bridge current a 10-ohm fixed resistor R_{12} was mounted between terminals X and Y with a potentiometer connected across the terminals. If a constant voltage is maintained across this resistor, then a constant bridge current is assured.

Flow system . . . The flow system is represented schematically in Fig. 3.

A vacuum pump was provided to evacuate the sample cell. A valve, opening from the cell to the atmosphere, permits the pump to be turned off under no-load conditions. A manometer served to indicate the gas pressure in the sample cell. Flow of gas into the cell is controlled as shown in Fig. 3.



FLOW SYSTEM assembly showing heater and fans.

Dry air was used as the reference gas. A ⅛-in. pipe nipple, capped at one end and containing calcium chloride crystals, was screwed into the reference cell gas inlet.

Adjustment of circuit . . . The adjustment and positioning of resistors R_1, R_2, R_3, R_4 were carried out at constant air-bath temperature, bridge current, and gas pressure.

The first step was to observe the Helipot dial readings obtained when the bridge was balanced with methane and then with isobutane in the sample cell. It was found that the bridge could not be balanced with methane since the balance point was off scale at the low end of the Helipot dial.

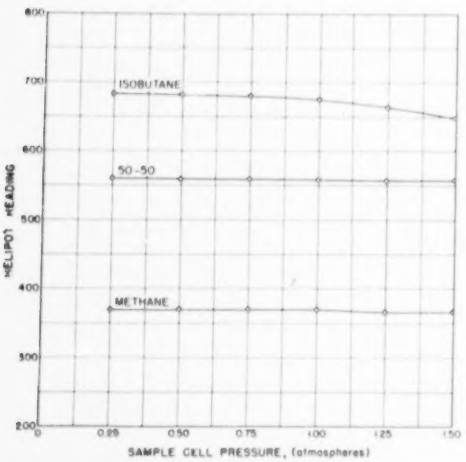
To bring the methane balance point onto the scale required adding an additional resistance at the opposite end of the slide wire. To maintain bridge symmetry half of the resistance was added between A and B, and the other half added between G and H. Resistance boxes R_1 and R_4 were used for this purpose and were set, by trial and error, at a value which put the balance points for methane and for isobutane approximately equidistant from the mid-point of the slide wire.

This resulted in a methane reading of approximately 400 and an isobutane reading of approximately 600 on the Helipot dial at bridge balance. Since the dial was graduated in 1,000 divisions it was desirable to have a much greater "spread" between the two end points. This was accomplished by shunting the slide wire with R_2, and a similar shunt, R_3, connected between terminals F and G maintained bridge symmetry. Resistance boxes were used for R_2 and R_3 and their optimum setting was determined by trial and error.

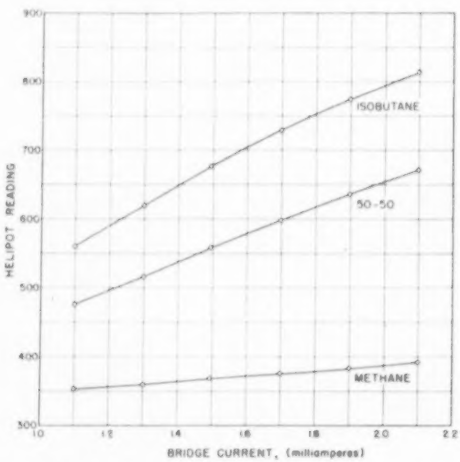
Preparation of samples . . . The calibration samples were prepared in the mixing chamber shown in Fig. 3. Methane was introduced into the evacuated mixing chamber and the pressure then read from a manometer. Isobutane was then introduced and the total pressure read after the mercury in the manometer leg connected to the mixing chamber had been adjusted to its previous level. This assured a constant-volume mixing chamber. The difference in the two readings was taken as the partial pressure of the isobutane.

Since the samples were prepared at room temperature and approximately 1.5 atm. the ideal gas laws were assumed, and the ratio of partial pressures considered to be equal to the mole ratio. The gas mixture was allowed to stand for several hours in the mixing tank, and a check on the thoroughness of mixing was obtained by making several runs on each sample.

Fig. 4 is the calibration curve that was obtained.



EFFECT OF pressure on bridge balance. Fig. 6.



EFFECT OF bridge current on bridge balance. Fig. 7.

Special Equipment

The thermal conductivity cell used, the Veco Cell Type 142, is pictured disassembled in an accompanying photograph, and is schematically represented in Fig. 1.

Referring to Fig. 1, C_1 and C_2 represent the cells for the gas to be analyzed and the reference gas. Two holes drilled into the bottom of the cell block and threaded to receive ⅛-in. pipe,

permit introduction of the two gases to their respective cells. Thermistors, mounted as shown in the photograph, are sealed into each of the two cells.

The Thermistors employed are carefully matched by the manufacturer. R_3 and R_5 are 230-ohm fixed precision resistors and are mounted within the cell block. R_6 is a plate-type Thermistor which can be used as a temperature compensator if no means of maintaining a constant cell block temperature is available. Since an air bath was used in this investigation R_6 was omitted from the circuit.

Galvanometers . . . A portable-type d.c. galvanometer was used to determine the approximate point of bridge balance. Final bridge balance was obtained with the use of a highly sensitive reflecting galvanometer.

Air-bath temperature control system . . . The heater and fan employed are shown in an accompanying photograph. A baffle, constructed of sheet metal wrapped with asbestos paper, was mounted directly above the heater to prevent radiation from the heater to the thermal conductivity cell block. A mercury thermal regulator, of the type used in Sayboldt viscosimeters, was mounted in the top of the unit next to the thermometer.

A "normally open" relay was used in conjunction with the thermal regulator to control the heater. Line Variacs permitted adjustment of fan speed and heater wattage. With the control system described, an air-bath-temperature uniformity of $\pm 0.1°$ F. was obtained.

Construction details . . . The flow system was constructed mainly of ⅛-in. copper tubing and Weatherhead fittings. Hoke needle-type valves were used throughout and provided close control of gas flow. Metal-to-glass seals were made with deKhotinsky cement and a mixture of litharge and glycerin was used to seal threaded joints.

Results

Fig. 4 is the calibration curve obtained for the methane-isobutane system, under these calibration conditions.

TABLE 1—CALIBRATION CONDITION

Air-bath temperature, °F.	100
Sample cell gas pressure, atm.	1.00
Bridge current, ma.	1.50
R_1, ohms	62
R_2, ohms	80
R_4, ohms	80
R_7, ohms	62

The effect of air-bath temperature, sample-cell gas pressure, and bridge current are shown in Figs. 5, 6, and 7. The slide-wire "spread" between methane and isobutane was decreased in order to provide a greater experimental range for these determinations. This was achieved by opening S_2 which removed the slide-wire shunt and gave a "spread" of approximately 250 Helipot divisions.

R_1 and R_4 were set at 50 ohms which placed the bridge balance points for methane and isobutane approximately equidistant from slide-wire center. Removal of the slide-wire shunt resulted in a reduction of instrument sensitivity. The effects shown would therefore be magnified at the conditions of calibration.

The effect of each variable was determined at levels of the other variables shown in Table 1.

Summary

An accuracy of ± 0.3 mole per cent was obtained in the analysis of a methane-isobutane mixture using this thermal-conductivity-type gas-analysis apparatus. The effects of temperature, pressure, and bridge current were studied with the following results:

1. Increasing the temperature from 95° to 120° F. effectively increases the thermal conductivity of isobutane but does not affect methane.

2. The effect of increasing the gas pressure in the sample cell from 0.25 to 1.5 atm. is negligible for methane but results in a gradual increase of thermal conductivity for isobutane from 0.75 to 1.5 atm.

3. The effect on instrument operation of increasing the bridge current is the same as would be observed if the thermal conductivity of the gas in the sample cell were decreased.

TABLE 2—PARTS LIST FOR ANALYZER

Designation	Description
R_1	0-1,000-ohm resistance box
R_2	0-1,000-ohm resistance box
R_3	0-1,000-ohm resistance box
R_4	0-1,000-ohm resistance box
R_5	0-200-ohm Helipot
R_6	230-ohm wire-wound precision resistor mounted in Veco cell
R_7	230-ohm wire-wound precision resistor mounted in Veco cell
R_8	100-ohm wire-wound precision resistor
R_9	100-ohm wire-wound precision resistor
R_{10}	10-ohm wire-wound precision resistor
R_{11}	500-ohm wire-wound rheostat
R_{12}	10 ohm wire-wound precision resistor
C_1	Thermistor sensing element
C_2	Reference gas Thermistor
S_1	SPST line voltage switch
S_2	DPST slide-wire shunt switch
S_3	DPDT galvanometer switch
S_4	Galvanometer key
V_1	0-5 V. d.c. voltmeter (panel mount)
L_1	Line voltage pilot light

Acknowledgment

The authors wish to express their appreciation to the Texas Petroleum Research Committee for sponsoring the work described in this article and to S. T. Preston and Dr. John J. McKetta, who as members of that organization directed the work in its earlier phases.

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Proper Mud Programs

(Continued from page 97)

Mississippian formations contain extensive deposits of salt, gypsum, and anhydrite throughout this section. Saturated-salt or gypsum muds are fabricated through addition of salt or gypsum in sufficient quantities to completely saturate the base mud.

In addition, other additives are employed for viscosity and filter loss control. Fermentation is prevented through addition of a preservative.

Gyp muds are ideally suited to the Beaver Lodge area, since formation salt and anhydrite may be drilled without adversely affecting properties of the drilling fluid.

From 20 to 60 bbl. of crude oil are added to the mud while penetrating the Mississippian Charles formation found at about 8,000 ft. at Beaver Lodge.

Typical mud properties in the Triassic and Mississippian sections in three recent completions in the Beaver Lodge field are described at intervals in an accompanying table. Formation pressures are normal in this area and do not pose a problem. Circulation losses are limited and not serious.

Test

Walker-Neer has engineered new answers to these 12 important questions:

1. Has "piling up and cutting in" of wire line, on the calf reel, been eliminated?

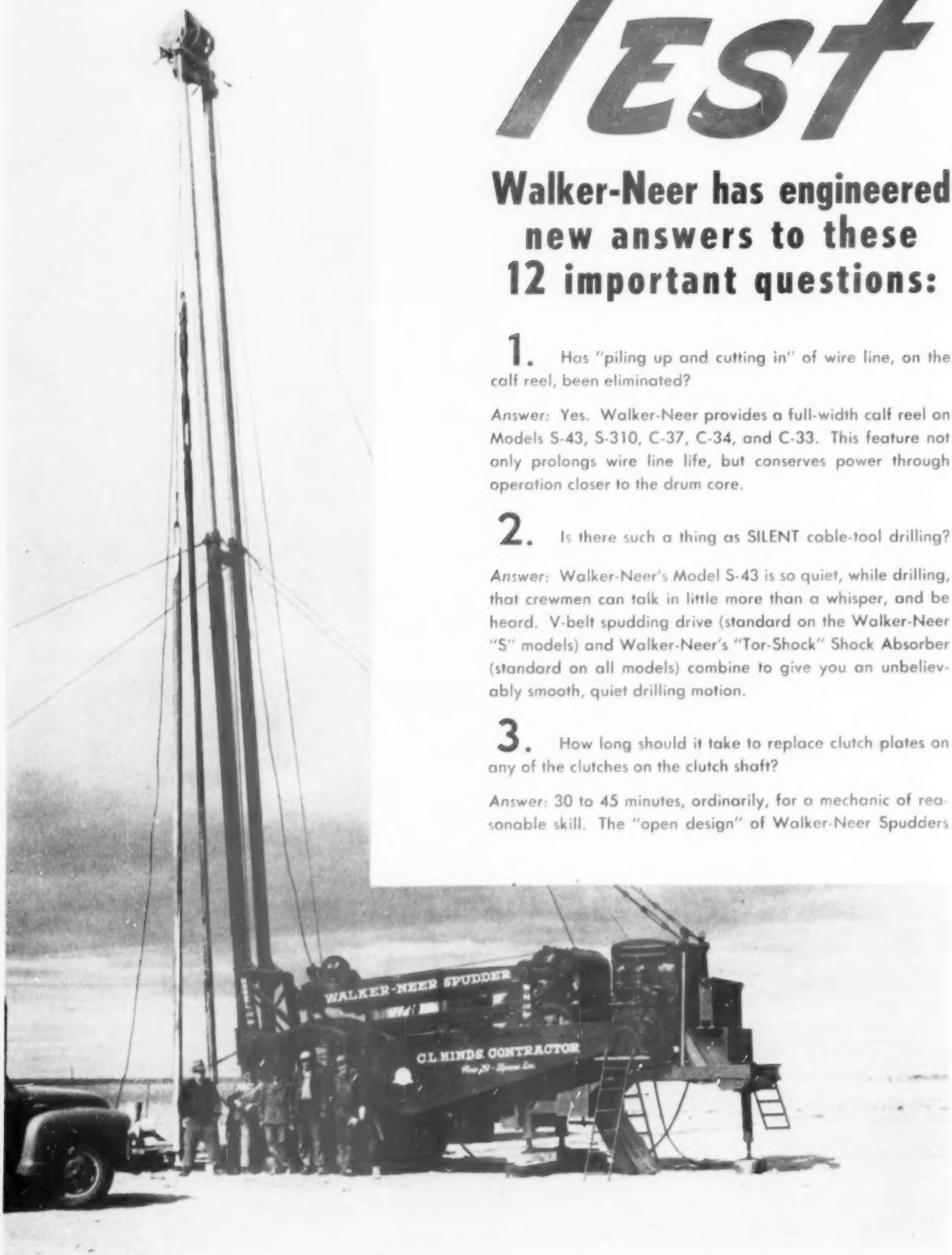
Answer: Yes. Walker-Neer provides a full-width calf reel on Models S-43, S-310, C-37, C-34, and C-33. This feature not only prolongs wire line life, but conserves power through operation closer to the drum core.

2. Is there such a thing as SILENT cable-tool drilling?

Answer: Walker-Neer's Model S-43 is so quiet, while drilling, that crewmen can talk in little more than a whisper, and be heard. V-belt spudding drive (standard on the Walker-Neer "S" models) and Walker-Neer's "Tor-Shock" Shock Absorber (standard on all models) combine to give you an unbelievably smooth, quiet drilling motion.

3. How long should it take to replace clutch plates on any of the clutches on the clutch shaft?

Answer: 30 to 45 minutes, ordinarily, for a mechanic of reasonable skill. The "open design" of Walker-Neer Spudders



Spudder your I.Q.

enables the removal of any drum or shaft without removal of any other.

4. Have control systems been improved?

Answer: Yes. Walker-Neer's control system enables instant starting and stopping of any drum or cathead, independently of other drives, by lever or pedal at the operator's platform.

5. What two-fold advantage is offered by the "rubber torsion shock absorber"?

Answer: Walker-Neer's "Tor-Shock" (rubber torsion) shock absorber provides (1) a "bottomless cushion" to every stroke of the tools, practically eliminating all solid jar, and (2) a quick, snappy spudding action.

6. How does V-belt drive increase economy and efficiency?

Answer: 3 ways: (1) V-belts on Walker-Neer Spudders have extra long life, save you replacement costs: (2) They assure a positive, hard-hitting stroke: (3) They reduce noise, thus add to the morale and efficiency of workers.

7. How many forward speeds should a spudder have?

Answer: Operators place great value on Walker-Neer's 4 forward speeds (1 reverse), standard on all models except the WS-31 and WS-20. It increases versatility and speed, conserves power, increases profits. It is a tremendous advantage in swabbing operations and in running and pulling casing.

8. How have lubrication problems been reduced?

Answer: Walker-Neer has accomplished this by means of all-ball-and-roller-bearing construction.

9. How quickly, after reaching location, can a spudder be in operation?

Answer: Allow from one to five minutes for raising the mast pole, by rig power, add only the time needed for securing guy wires, and there's your answer—frequently less than one hour! Walker-Neer's tubular telescoping mast poles require no bracing, no mast-pole climbing.

10. How deep can you drill with a spudder?

Answer: 10,000 feet or more. Walker-Neer's model S-310, largest spudder in the field, provides 10,000-foot drilling and 14,000-foot workover. Walker-Neer's complete spudder line (9 models), ranges all the way from the giant S-310 to the WS-20, rated to 500 feet.

11. Is brake ring heating, and brake band replacement, a problem in deep operations.

Answer: No. 15" double 15-inch Rotor HYDROMATIC BRAKES, another Walker-Neer first, are standard on the Model S-310, and optional on other models. They practically eliminate brake band replacement.

12. Can an all-air-operated spudder be obtained?

Answer: Yes. Walker-Neer built the first one in 1951. It's another pioneering achievement by Walker-Neer.

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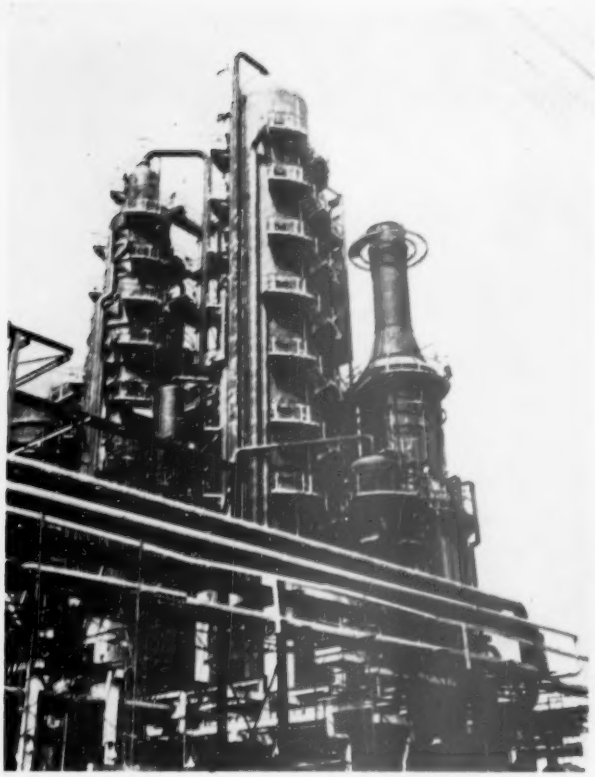
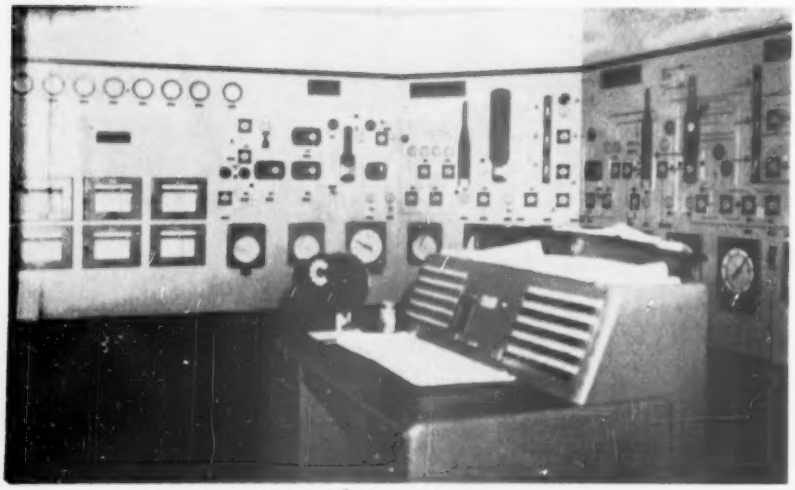


MAIN PROCESSING UNITS include secondary vacuum tower, primary vacuum tower, and secondary crude tower.

LIGHT ENDS SECTION of the crude unit includes rerun tower, depropanizer, dependanizer, and debutanizer.

Sinclair's Houston Refinery Gets New Crude Unit

by F. Lawrence Resen
Gulf Coast District Editor



CONTROL ROOM of the 35,000-bbl. crude unit.

AS part of its general expansion program at its Houston refinery, Sinclair Refining Co. has placed on stream a new 35,000-bbl. per day crude unit, including a light-end-recovery section.

With the introduction of an additional 15,000 bbl. per day of reduced crude from an existing crude unit to be charged to a secondary vacuum flash tower and two process streams to a dependanizer column, the entire input to the unit will total some 62,000 bbl. daily.

Design of the unit was pointed to fill the following needs:

1. Increase plant production of straightrun products of gasoline, naphtha, water-white distillate, and diesel oil.

2. Provide light, medium, and heavy lube-oil cuts for solvent treating.

3. Supplement feed stock to new fluid catalytic cracking unit by production of heavy gas-oil stream.

4. Provide straightrun fractionation facilities for production of a butane fraction, a pentane fraction, straightrun gasoline, and reforming stock.

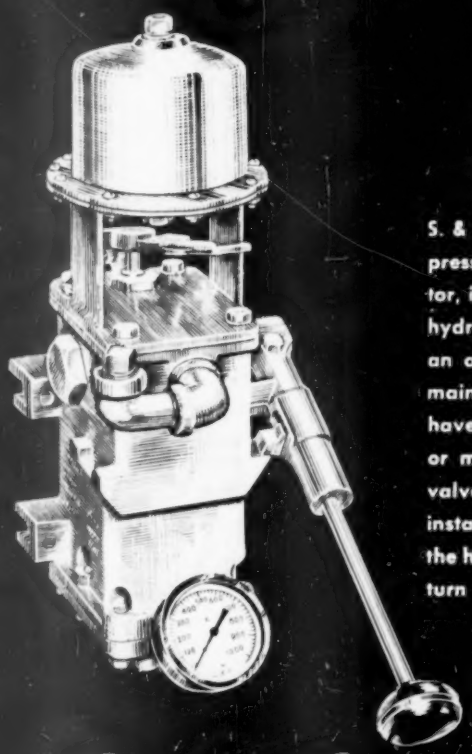
5. Permit production of asphalt as desired.

Main output of the new unit consists of (on a design basis) approximately: 14,000 bbl. of heavy gas-oil; 12,000 bbl. of stabilized gasoline; 3,800

S&J HYDRAULIC SAFETY VALVES

for Storage Tanks and Pipe Lines

Pictured here are two Shand & Jurs products which are the key components of the S. & J. Internal Hydraulic Safety Valve System for handling petroleum products through high pressure storage tanks and pipe lines, a system that enhances your Safety Factor appreciably, and safeguards your equipment in event of exposure fires. The S. & J. hydraulically operated valve shown at the right is located in the discharge opening of the tank. It has a cast steel base and is recommended for operating conditions up to 300 pounds. In pipe line service the valve is installed in a pipe line spool. The valve base is sandwiched between two pipe flanges and the periphery of the valve base is the only portion exposed.



S. & J. Hydraulic Valves are normally held closed by spring pressure, and can be opened by the S. & J. Hydraulic Operator, illustrated at the left, or by a small electrically operated hydraulic pump. This special Hydraulic Operator embodies an air pressure chamber with piston and stem, for use in maintaining pressure in the hydraulic system, once the valves have been opened. Release of this air pressure by automatic or manual means, in case of an emergency, permits the valves to close. Fusible plugs which melt at 165° F. are also installed at strategic points in the hydraulic line and release the hydraulic pressure automatically in event of fire, which in turn closes all valves held open under pressure.

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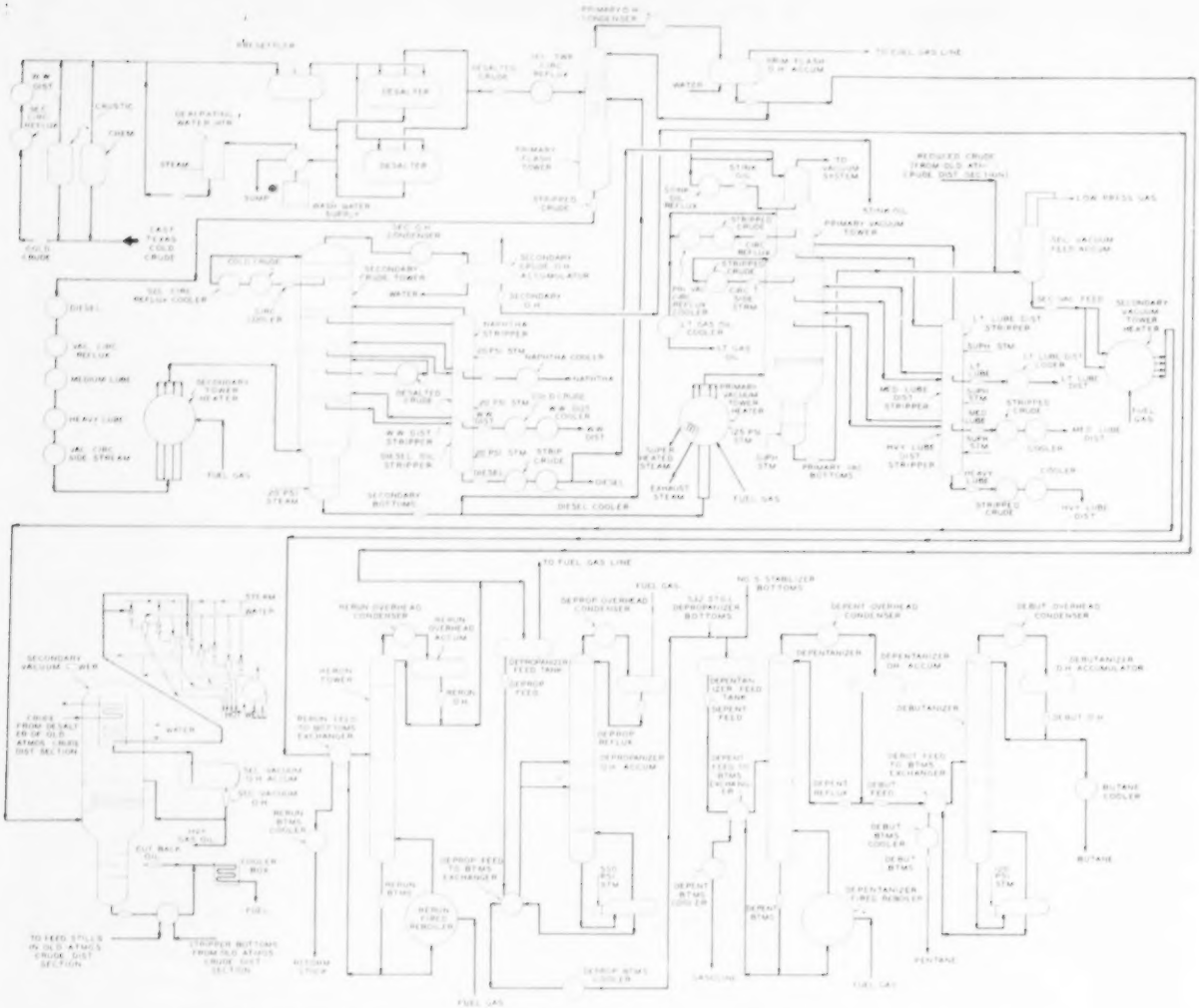

SCHEMATIC FLOW DIAGRAM for Sinclair's new 35,000-bbl. crude unit at the Houston refinery.

bbl. of lube-oil stock; 5,500 bbl. of asphalt; 6,000 bbl. of kerosine; 4,500 bbl. of diesel; and 4,500 bbl. of pentanes.

Process flow . . . Main equipment of the crude unit consists of a desalter, primary flash tower, secondary crude tower, primary and secondary vacuum towers, depropanizer, dependanizer and debutanizer of the light ends unit, and auxiliary strippers and heat exchangers.

East Texas crude is charged to the unit at a rate of 35,000 bbl. per day after first passing through preheaters and the desalter. Water and chemicals are added to the preheated crude to dissolve and absorb salt compounds after which electrical desalting equipment is used to break the emulsion formed and thus allow separation of the crude and brine.

Crude from the desalter is pumped through circulating sidestream exchangers of the secondary crude tower and then charged to the primary flash tower. This tower, which is designed for 75 psi. pressure, is equipped with four baffles and then four trays in its upper portion. The crude enters between the trays and baffles where flashing occurs, with overhead product used for reflux and as depropanizer feed.

Stripped crude bottoms from the flash tower are exchanged in a series of passes through sidestream and reflux heat exchangers and then further heated before being charged to the secondary crude tower. This tower and its associated equipment is for the purpose of topping the stripped crude, taking various sidestream cuts and then passing the bottoms on to a vacuum tower for lube-stock production.

Strippers . . . The secondary crude tower contains 30 bubble-cap trays above the flash section just between the upper and lower set of trays. Sidestreams are taken off three trays in the secondary tower and run through appropriate strippers to obtain the desired cuts for blending of finished products. Naphtha, water-white distillate, and diesel-distillate are obtained from the three strippers with each comprising one-third of a vertical stripping column.

Naphtha is obtained by drawing product from Tray No. 9 and venting stripper overhead back above Tray No. 8. A similar drawoff system finds water-white distillate obtained from Tray No. 15 and stripper overhead is vented above Tray No. 14. Diesel distillate is withdrawn from Tray No. 24 and stripper overhead is vented above Tray No. 23. A midtower recycle stream is drawn from Tray No. 17, cooled in a heat exchanger with desalted crude, and then returned to the tower above Tray No. 16.

Tower overhead is condensed, passes into an accumulator, and is then charged to a rerun tower for production of finished No. 1 gasoline. Re-

(Continued on page 113)

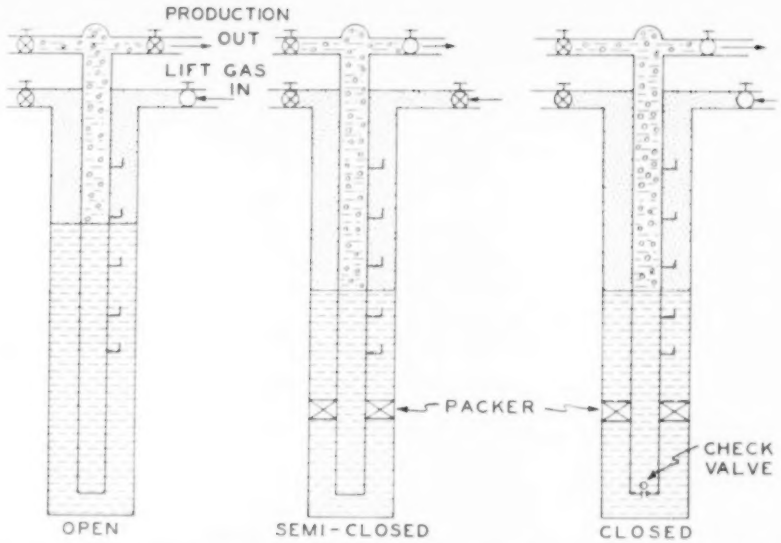

Fig. 1—The three basic types of gas-lift installations. Addition of a packer and check valve in the tubing prevents injection gas pressure from acting on the producing formation.

Fundamentals of Gas Lift

Part 1—Introduction

The phenomenal rise in the economic value of gas has made strict accounting for its use mandatory. This condition has further increased the number of instances where only a limited gas volume is available and at only a limited well-head pressure. In short, it has greatly increased the number of gas-lift installations at the economic border line.

The inevitable result has been the demand for a constructive, quantitative analysis of the gas-lift design problem. The series that begins with this article and that will continue through subsequent issues will cover as thoroughly as possible all aspects of the design of individual gas-lift installations.

by Prof. C. V. Kirkpatrick

THE actual removal of liquids by means of the gas-lift principle goes back to the eighteenth century when compressed air was employed to remove water from flooded mine shafts. The principle was first applied to lifting oil in Pennsylvania around 1865 and reached the Gulf Coast fields about 1900 where it began to receive an intensive application.

California began to utilize the method about 10 years later and gas as the lifting medium made its appearance shortly thereafter. Natural gas proved a more satisfactory lifting medium than air because: (1) it is safer; (2) it does not have the corrosive effects of air; and (3) it is often available in quantity and under pressure.

Author is chairman, department of petroleum engineering, University of Houston.

The early applications employed the simple U-tube principle and were limited to those wells that had high liquid levels because of the excessively high kickoff pressures necessary in the low-liquid-level wells. It was the low-liquid-level wells that brought about the development of the mechanical gas-lift valve as it can perform with considerably less pressure.

The next problem was the high capacity — low-liquid-level — low bottom-hole pressure well. High-pressure gas in the casing annulus, acting directly against the exposed reservoir, prevented satisfactory recovery by the old type of installation; and the problem was partially resolved by introducing a packer between the tubing and casing. However, application was still partially unsatisfactory until a check valve in the tubing was added.

Before the introduction of this final type of installation, gas lift was considered strictly as an intermediate means of lifting oil. Unfortunately, this concept has carried over until recent times, but is now being rapidly dispelled.

Fig. 1 is a schematic illustration of the three basic types of gas-lift installations commonly referred to as open, semiclosed, and closed.

Present applications and refinements of gas lift see lifting depths of 13,000 ft., liquid production of from 3 to 25,000 bbl. per day from reservoirs whose pressures range from 35 to 4,000 psi. Successful applications to dually completed wells, the introduction of macaroni strings to overcome leaky casing and to better handle low capacity reservoirs, improved valves, and the recent introduction of the wire-line retrievable valve all have contributed to a considerable increase in the scope of application of the gas-lift operation.

Economics of gas lift . . . It is important to consider the limitations of the gas-lift system as regards its applicability. The three major limitations are: (1) gas; it must be available in adequate quantity and at ample pressures for an extended period of time; (2) low-gravity crudes; although wells have been produced with crude oil gravities as low as 9° A.P.I., the record shows that producing oil by gas lift encounters increasing difficulties for the lower-gravity crude oils, and (3) emulsification tendencies; this is closely associated with the low-gravity-crude problem.

Availability of gas is the principal limitation of gas-lift application. Just a few years back, this statement had to read "available high-pressure gas." However, manufacturers have made available small packaged compressor

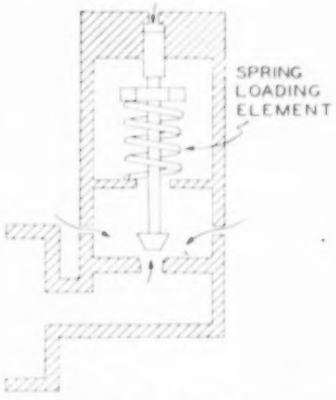

Fig. 2—Straight spring-loaded differential valve. The valve is held inherently open until placed in the well where casing pressure acting on the piston tends to close it.

units to handle installations ranging from one to five or more wells per unit with compression cost running approximately 2 to 2½ cents per M.c.f.

Improved equipment and improved design practices have greatly enlarged the scope of application of the gas lift. If gas is available and the crude is of the type that can be produced by gas lift, it will generally be the most economical method of artificial lift.

Common applications . . . The most common type of application is one in which the gas is injected in the annulus and the production returned through the tubing. Conventional pressure charged valves are used with all valves set at either the same charge pressure or in a decreasing pressure sequence down the well bore. This will be the type of installation generally referred to except where specifically designated otherwise.

The less-common types of installations are: (1) dual completions, (2) use of macaroni strings or small pipe within the tubing, (3) high fluid volumes produced through the annulus, and (4) the use of the gas-lift plunger. The "ball pump" recently introduced may be included as a fifth category.

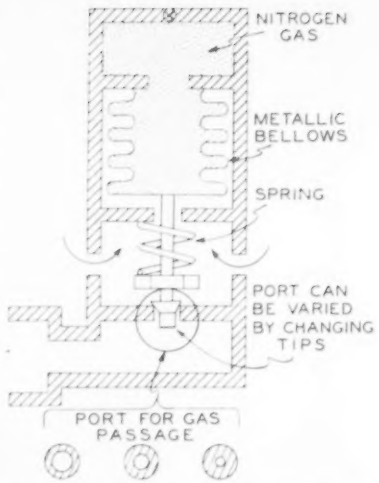

Fig. 3—Continuous flow valve. The combination of pressure-charged bellows and spring loading with the variable port furnishes automatic continuous flow.

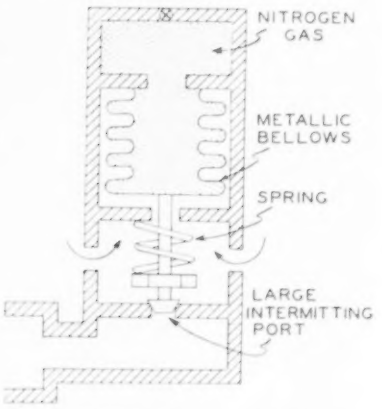

Fig. 4—Pressure-charged intermitting valve. A large port for passage of gas is necessary to impart a high initial velocity to the liquid column in the tubing.

Gas-Lift Valve Mechanics

There are three principal design problems in the gas-lift: (1) continuous flow installation; (2) the intermittent flow installation; and (3) the borderline well.

Continuous flow design requires controlled injection of gas into the moving fluid column in order to provide sufficient aeration to keep the column moving at the desired rate. The desired rate is the one that will give the necessary oil production with a minimum gas-oil ratio.

For this type of installation there are two general types of valves available; one, commonly termed the differential valve in which the loading force of the valve holds the valve inherently open until placed into the well, and the other, commonly termed automatic continuous flow valve, in which the loading

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They can be inverted to "hold-down" against flotation of surface pipe during cementing.

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force holds the valve inherently closed until place in the well.

For most wells, the latter type valve is superior in that it offers much better control. These two valve types are illustrated schematically in Figs. 2 and 3.

Intermittent flow design also requires controlled injection of the gas but in a very different manner. For optimum performance in intermittent flow, the column of oil must be removed from the tubing in such a manner as to have minimum slippage, fallback, and commingling of the oil with the injected gas. The column of oil is comparable to the projectile in a rifle.

To accomplish the desired results, the valve must have an instantaneous opening action and a large port area, in order to provide maximum starting velocity to the column of oil. The general type valve, available to perform this operation, is shown schematically in Fig. 4.

In the case of the automatic continuous flow valve, the valve must be sensitive to the tubing flowing gradient at all times. If the flowing column becomes too light, (too much aeration) the valve must respond by restricting the injected gas.

Conversely, if the flowing column begins to "log up" the valve must respond by allowing more gas to enter the column. In short, the operation of this valve is principally determined by the flowing gradient or back pressure exerted in the tubing.

The intermitting-type valve, on the other hand, is relatively insensitive to the tubing pressure. This valve is so designed that its response to the liquid column buildup can vary from nil to some nominal value, but the liquid column buildup is rarely, if ever, a controlling factor in the valve operation.

Efficient Disposal of Waste Water

(Continued from page 87)

skimming section is shown ahead of the raw-water basin. Actually the two sections are side by side at the end of the 100-ft. basin. Oil and emulsion trapped in the pit are lifted by a centrifugal pump and moved to the dehydration plant.

Chemical treating . . . From the surge tank the raw water gravitates to the primary mixing and reactor zone of a conventional accelator treating tank. Water entering the basin contains 150 p.p.m. of floatable oil and 600 p.p.m. of dispersed oil. Through chemical treatment these are reduced to 5 and 50 p.p.m., respectively, in the effluent water.

Chemicals employed are activated silica, lime, and alum. In addition ferrous sulfate is added whenever a batch of soluble sulfide water is anticipated. Warning that such water may be expected is accomplished through periodic sampling of the waste water as it enters the separator.

The activated silica is bath mixed, volumetrically, in a 12-bbl., tank by adding sodium silicate to a water solution of ammonium sulfate. The solution then is pumped to the reaction zone of the treating tank in response to controls later outlined.

The other chemicals are dumped into a bucket elevator, equipped with a dust collector, and conveyed to the proper storage hoppers. From there they feed into small tanks where they are mixed with water and the slurry then injected into the accelator.

Chemicals control . . . Controls are set for the chemicals to be introduced at the following rates: Activated silica, 10 p.p.m.; lime, 35 grains per gal.; and alum, 10 grains per gal. If the volume of water passing through the system increases, frequency of injection automatically speeds up to maintain this established rate.

The mechanism controlling the volume of chemicals injected, a Chrono-

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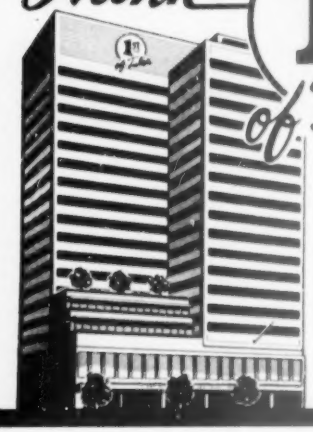

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flow controller whose transmitter is actuated by the level of the effluent water in passing through a weir, also controls the rate of sludge withdrawal from the concentration sections of the accelator. Normally the motor-driven centrifugal pump used to remove the sludge from the pits operates on a time cycle. But if the volume of water being treated increases, the Chronoflow controller overrides the time-cycle controls to speed up sludge removal.

From the pits the sludge is charged to a precoat diatomaceous earth rotary filter. There the excess water is removed by vacuum pumps and the sludge deposited on the filter drum. Extract from the drum, after flowing through a dropout pot, is returned to the primary separator.

Currently, treated water from the accelator, except that used for chemical mixing and for precoating and backwashing the rotary filter, is run to the old open skimming pits before being discharged to the sewer. Steps are being taken, however, to reuse about two-thirds of this volume.

Approximately 900 g.p.m. is being discharged at present. Of this volume 650 gal. would be recovered. It first would be run through a sand filter, from which 120 g.p.m. then would be sent to the coking units as makeup water in the coke-removal system. The remaining 530 gal. would be passed through a zeolite treater to reduce its carbonate hardness. It then would be pumped into the cooling-tower system.

Sinclair's Houston Refinery Gets New Crude Unit

(Continued from page 108)

duced crude from the bottoms meanwhile is reheated and charged to the primary vacuum tower.

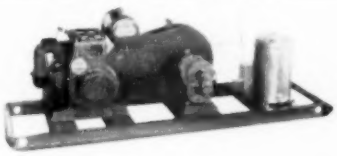
Lube-oil . . . The primary vacuum tower is used to produce neutral distillate cuts, and is designed for 15-psi. external and 25-psi. internal pressure. The tower is provided with 31 trays and includes a demister pad just above the flash section and one in the upper portion of the tower to remove and knock back entrained oil.

Sidestreams are withdrawn from this tower and charged to three strippers for the production of lube-oil distillates. The three strippers involved are arranged in a vertical column similar to the secondary crude tower stripper, with light lube distillate produced from the upper stripper, medium lube produced from the middle stripper, and heavy lube distillate produced from the lower stripper. Sidestreams for these three products are obtained from Trays Nos. 10, 16, and 20 respectively, with stripper overhead returned to the next higher tray in each instance.

Vacuum is held on the tower by two parallel sets of three-stage ejectors. Each stage consists of two ejectors discharging to barometric condensers with the final ejectors discharging to a surface-type condenser which vents to atmosphere. Tower pressure is controlled by recycling gases from the third-stage ejector discharge back ahead of the first-stage ejectors. If the pressure begins to rise, this recycle will begin to shut off and ease the load on the ejectors to allow them to bring the pressure back down.

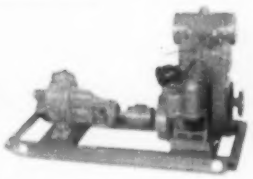
Bottoms from the primary vacuum tower are collected in an accumulator drum, where they are joined by a stream of reduced crude from another plant crude unit. This incoming stream is to operate at a design rate of 15,000 bbl. per day. Feed for the secondary vacuum tower is obtained from this accumulator drum after first passing through a preheater.

Gas-oil . . . The secondary vacuum tower is designed to recover heavy gas-oil feed from the reduced crude and primary vacuum tower bottoms, with this gas-oil serving as part of the charge stock to the plant's new fluid



TREAT "BAD" OIL

WITH A GOOD UNIT



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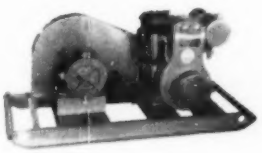
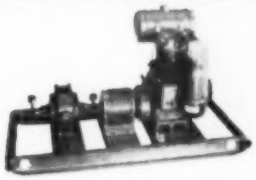
WISCONSIN Air-Cooled HEAVY DUTY ENGINES



Range:
3 H.P. to
36 H.P.



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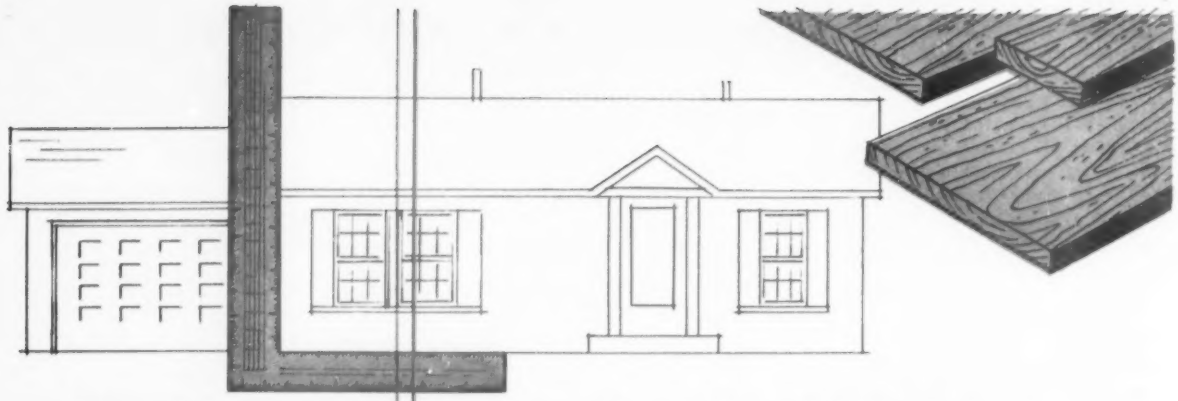

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TABLE 1
Yields

Feed	Bbl. per day
Crude charge	35,000
Reduced crude	15,000
No. 532 Still depropanizer bottoms to D-C5	8,150
No. 5 Stabilizer bottoms to D-C5	3,800
Total	61,950
End products	
Propane and lighter to fuel gas	200
Butanes	3,550
Pentanes	4,500
Stabilized No. 1 gasoline	12,250
Heavy gasoline—reform stock	1,950
Naphtha	3,650
Water-white distillate	5,150
Diesel distillate	3,450
Stink oil	350*
Light gas-oil	3,200*
Light lube distillate	650
Medium lube distillate	2,300
Heavy lube distillate	850
Heavy gas oil	14,300*
Asphalt	5,600
Total	61,950

*Total of 17,850 bbl. per day for fluid cat cracker unit charge.

catalytic cracking unit. Tower bottoms are blended with cutting oil and used as fuel. Later straight asphalt bottoms may be vis-broken on thermal stills or may eventually be sold as asphalt.

The secondary tower has four baffles below the flash section and three trays above. The lower of these trays has chimneys but no caps so as not to restrict upward flow of vapors immediately leaving the flash section. The tower is equipped in its upper section with internal exchangers and condensers and an accumulator pan. Vapors enter the tower at a tangent and are deflected downward by an inverted trough, and then flow upward through the capless tray, then through a demister pad and the two capped trays. Condensed and cooled gas oil is collected and drops into the overhead accumulator from where gas oil is obtained to feed the fluid unit.

Inert gases are trapped and enter the ejection system. The vacuum is held on this tower similar to that on the primary tower, through the utilization of two parallel sets of three-stage ejectors.

Rerun tower . . . Secondary crude tower overhead is received into the light-ends section by the 30-tray rerun tower, which splits the overhead into light gasoline, which passes overhead to the depropanizer, and heavy reforming stock which is withdrawn as rerun bottoms.

The rerun overhead is joined by the stream from the primary flash tower overhead and the two charged to the depropanizer. Fuel gas is withdrawn overhead from the depropanizer while its bottoms are fed into the depentanizer feed tank. It is at this point that depropanizer bottoms from another still and stabilizer bottoms from another unit enter the light ends system to be charged, along with the depropanizer bottoms, to the depentanizer column.

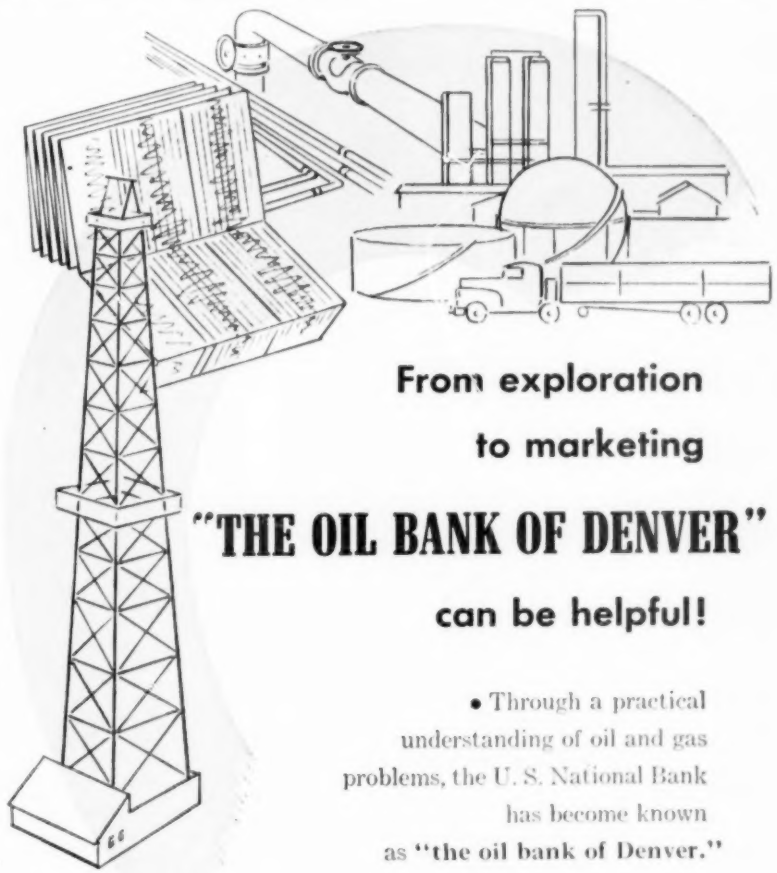
Bottoms from the depentanizer are recovered and used for gasoline blending in the plant. Meanwhile, overhead, consisting of butanes and pentanes, is fed to the debutanizer. Here a butane overhead is obtained for gasoline blending while the bottoms, primarily iso and normal pentanes, are charged to the pentane splitter.

The new unit was designed, and engineered by Sinclair Refining Co. personnel, and constructed by Fluor Corp.

BOOK

SOME UNSOLVED PROBLEMS. Assembled by Administrative Committee on Research of the A.S.T.M. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia. 24 pp. Gratis.

Here is a listing of what the various technical committees of the society regard as research-worthy problems. The list will be sent to various engineering and science schools and to research institutes and testing laboratories as suggested bases for possible research work. All of the problems are presented in the same style—title, name of A.S.T.M. committee responsible for work in this field, present state of knowledge, questions that need to be answered, and introductory references.



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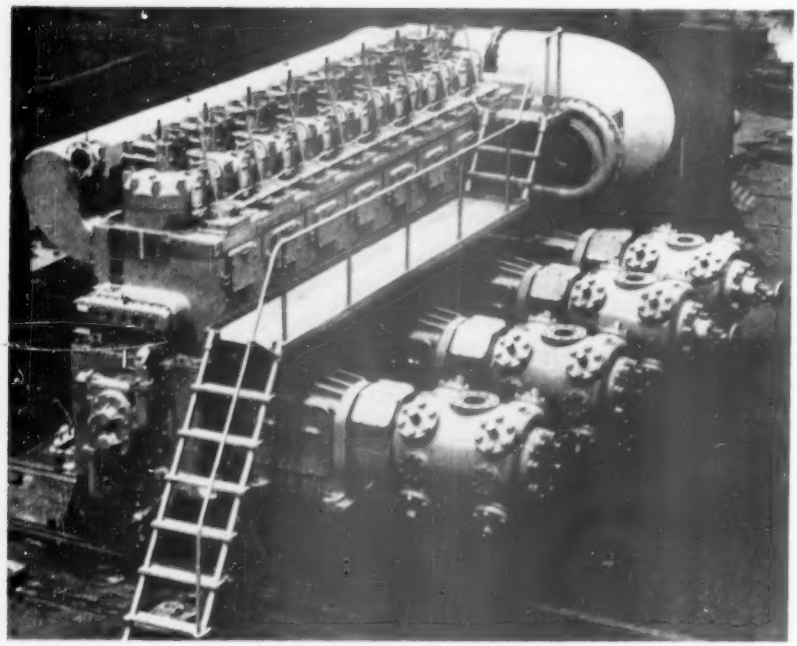
Pipeline Patrol



NEW TURBOCHARGED COMPRESSOR . . . This new compressor, designed and built by Clark Brothers as Model TRA, utilizes a turbocharger driven by exhaust gases. Compared to older units, this model is much more efficient.

Two-cycle turbocharged compressors prove efficient

A NEW turbocharged gas-engine-driven compressor has been designed specifically to provide substantial savings in fuel and water consumption while delivering more power per cubic inch of piston displacement. The new compressor is built in five sizes covering the 825 to 1,650-b.hp. range. A larger model is built in three sizes covering the 2,000 to 3,300 b.hp. range. Production models of both have been shipped to gas pipe-line companies and will be installed and operating shortly.

Much more efficient . . . The degree of success attained in the new design can best be shown by the actual performance figures of the model as compared to nonturbocharged, high-compression units of similar size. Under test, the new unit is said to:

- Burn 12½ per cent less fuel.
- Develop 50 per cent more power.
- Require 40 per cent less water to cool.

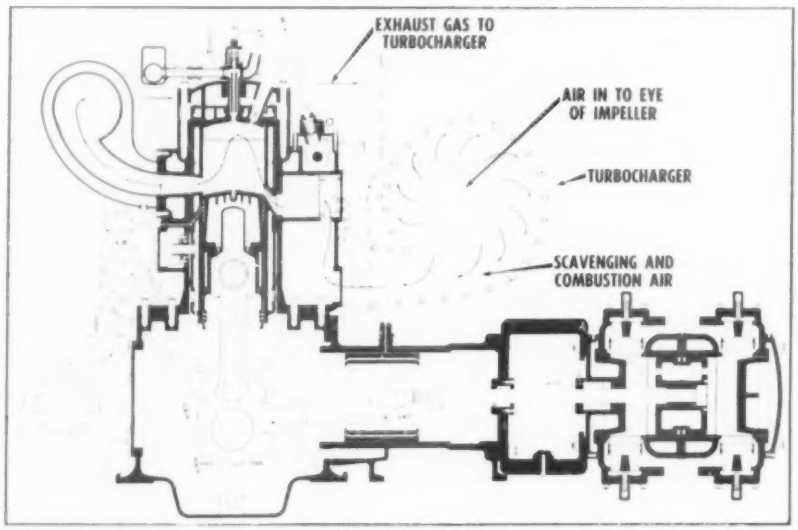
Quieter operation and a flat fuel-consumption curve are other outstanding features.

In modern compressor-station design, roughly only one-third of the cost of the station is represented by the compressors themselves, the balance of the cost being attributed to land, buildings, foundation, piping, cooling facilities, and other auxiliaries.

How it works . . . Conventional nonturbocharged two-cycle gas-engine-driven compressors require some type of scavenging cylinder or pump to furnish air for scavenging the engine of exhaust gases and to provide air for combustion. Power to drive these pumps or cylinders is provided by the engine crankshaft. The new turbocharged units do not require scavenging cylinders. Instead the exhaust energy which was formerly vented to the atmosphere is used to drive an exhaust-driven blower or turbocharger converting this "waste" energy into useful work.

The new compressor, like its nonturbocharged predecessor, has a 14-in. bore and 14-in. stroke. It also uses many of the proved design principles of the older model but here the similarity ends. It has been designed to carry the 50 per cent increase in power with the same degree of safety and dependability associated with the nonturbocharged unit. Its b.m.e.p. of 92 is extremely conservative for a unit of its massive proportions.

Designer and manufacturer of these units is Clark Brothers Co., of Olean, N. Y.



CROSS-SECTION of two-cycle gas-engine-driven compressor showing path of exhaust gas for turbine drive and that of scavenging and charging air.

New Method for Yard Coating of Pipe

TREADLESS tires, automatic-hydraulic jacks, and a rotating-head coating machine are incorporated in a new design for the yard coating of pipe. This method utilizes the familiar line-traveling machine in a stationary operation which increases output and efficiency in yard work.

The pipe which does not rotate, is pushed into the coating machine by powered dollies, is coated by a spray-type shoe, and wrapped by a revolving wrapping head. Movement of pipe through the coating machine does not stop with each joint as in older layouts. Succeeding joints are butted together and fed continuously to the machine. This design eliminates the need for spiders, which are normally used to join lengths of pipe temporarily for passage through a coating machine.

Enamel supply is turned off as the joint ends come under the spray shoe but the wrapping head continues to rotate. Excess paper is trimmed from the joint ends when the pipe is on the receiving rack.

Emerging from the water bath, which hardens the coating quickly, the pipe progresses onto a line of treadless-tire rollers. These smooth tires, with enough bearing surface to prevent coating damage, carry the pipe to the end of the receiving line. Since the pipe does not rotate, the tires are not skewed but have their axels perpendicular to the direction of pipe movement.

At the end of the roller line, the pipe strikes a vertical plate which trips a hydraulic-jack system. In one movement, the jacks raise the joint, pull it away from the following joint, and push it onto the receiving rack.

The over-all design, which reduces labor costs and speeds production, was developed by Tulsa Pipe Coating Co. It was recently used near Purcell, Okla., in coating 23 miles of 16-in. and 20-in. pipe for Cities Service Gas Co.

Couplings Need Protection Too

LINE coupling is jumpered with 1/0 bonding cable to give a continuous path for protective current. Note that coupling is bonded so that it will receive protection also. Thermite-welded connections are to be coated to prevent local-cell action.

Mobile Tool Benches Speed Maintenance

MOBILE tool benches facilitate speedy maintenance of equipment at Texas Eastern Transmission Corp.'s compressor station near Danville, Ky. The handy tool board and large equipment compartments provide operators with readily accessible tools.

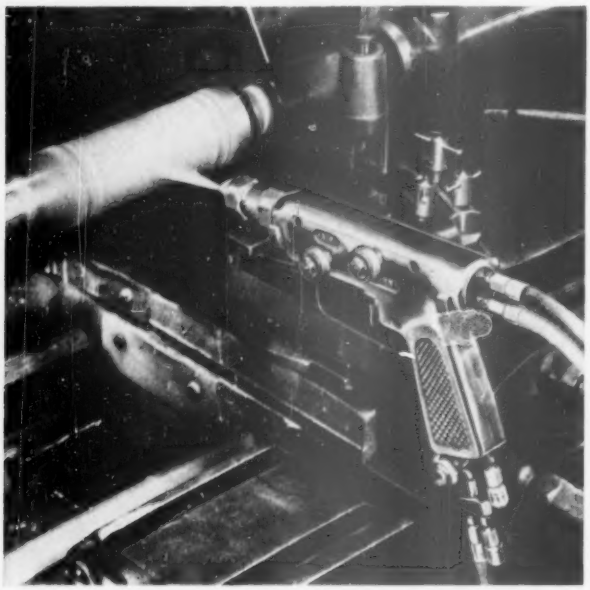


Fig. 1—Spraywelding a pump plunger with No. 6 alloy in a typical engine lathe setup. The lathe cross-slide is machine-fed back and forth across the work.

Fig. 2—Fusing the No. 6 alloy to the pump plunger surface with an acetylene torch to provide a welded bond of nonporous corrosion and wear-resistant material.

Sprayed-on, fusion-bonded coatings increase life of pump parts

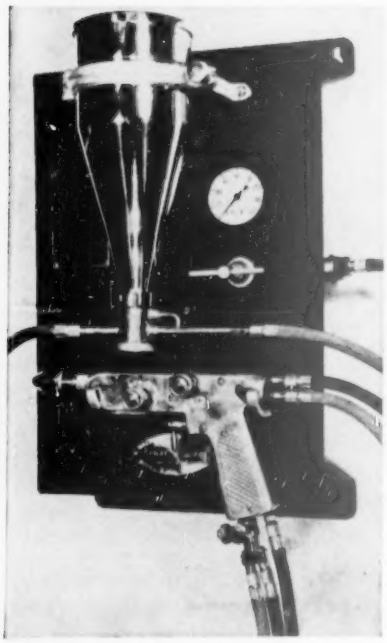


Fig. 3—A closeup view of the Spraywelder unit. The unit can be mounted on the wall or supported by an individual stand.

by L. V. La Rou

PUMP parts hard-faced by a metal-spraying process developed by Wall Colmonoy Corp. that provides a fusion-bonded coating are lasting from four to eight times as long as new unprotected parts in oil-producing and refining equipment. Increased life of these parts results from the wear and corrosion resistance of a nonporous nickel-base alloy surface that is applied by the process in thicknesses from 0.030 to 0.060 in. The alloy surface has a low coefficient of friction that reduces packing wear and reduces down time for pump repacking.

Maintenance costs for pump components are further reduced because the Spraywelded surface can be renewed by the same process after extended periods of operation, thus avoiding the purchase of new parts.

The Sprayweld Process

The first step in coating a new or reclaimed pump part, such as a plunger, by the process is to turn down the diameter of the surfaces to be hard-faced in a lathe, so that a final alloy thickness of about 0.045 in. remains on the part after processing. Then the plunger is grit-blasted with steel grit to provide a surface to which the sprayed-on alloy will adhere before fusing.

The plunger is next chucked in a lathe and rotated while the alloy is applied by spraying with a pistol unit (see Fig. 1) mounted in a holder attached to the lathe tool post. The pistol is machine-traversed back and forth across the rotating workpiece until a uniform coating, slightly larger than the finish ground o.d. is applied. The light weight and maneuverability of the spray pistol permits manual spraying operations to be done if desired.

Warpage Eliminated

A fusion-bonded, nonporous welded overlay is achieved in the next step, Fig. 2, when the pistol unit is fed out of the way and the part rotated in the lathe under an oxyacetylene torch. Warpage of the plunger in this step is practically eliminated because only sufficient heat to fuse the thin overlay is necessary.

The final step in preparing a Spraywelded pump plunger before installation in pumping equipment is to finish-grind the diameter of the hard-faced surface to the correct dimension. In applications where a ground finish is not required, the surface can be turned with a carbide tool.

Author is chief engineer, Wall Colmonoy Corp.

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Properties of the Alloy Surface

The No. 6 alloy applied by the process is in powder form. It is a nickel-base alloy containing chromium, boron, and nickel and has a Rockwell C hardness from 56 to 61. It is nonmagnetic, has a specific gravity of 7.80, and melts at 1,900° F.

Among its physical properties are high resistance to abrasion, corrosion, and galling. Further, No. 6 alloy has good impact resistance and excellent red hardness. While in its plastic range from 1,850° to 2,050° F., No. 6 will bond to steels, stainless steels, some cast irons, and some copper alloys without flowing or losing its shape.

Two other alloys—Nos. 4 and 5—having Rockwell C hardnesses ranging from 35 to 50, can also be treated. Like No. 6, these alloys have high corrosion resistance in addition to high resistance to oxidation at elevated temperatures.

These alloys have outworn hardened steel 5 to 25 times in petroleum-industry applications. They resist all organic acids and alkalies.

Alloy-Spraying Unit

The complete alloy-spraying unit, Fig. 3, including pistol, hopper, carburetor, hoses, air regulator, and air filter is mounted on a panel that can be mounted on a wall or stand adjacent to the processing lathe. To use this equipment, an auxiliary oxygen and acetylene tank and a source of air capable of delivering 10 cu. ft. per minute of dry air at 60 psi. pressure are required.

Typical Applications

A wide variety of pump sleeves, pump rods, and compressor rods can

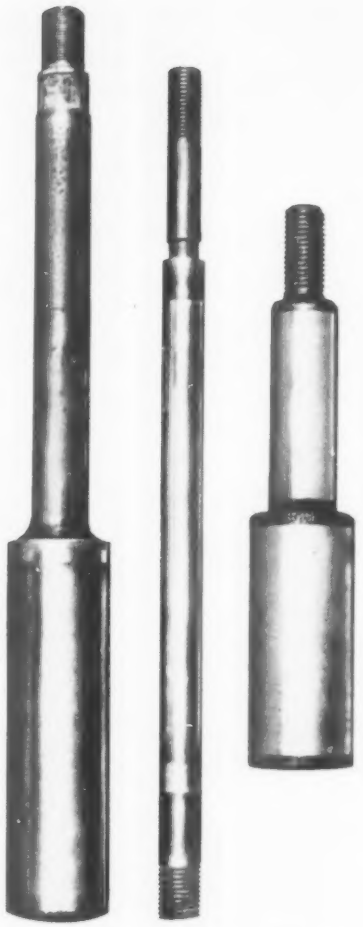

Fig. 4 Fig. 5 Fig. 6

Fig. 4—A Spraywelded plunger after 22 months' salt-water service. This plunger is coated with a 0.040-in. thick overlay of Colmonoy No. 6. It lasted about eight times as long as a new uncoated plunger in the same service and avoided daily packing gland maintenance.

Fig. 5—A Dubbs gasoline pump plunger that has run continuously for 2 years. Coated with a 0.035-in. overlay of Colmonoy No. 6, it has outworn uncoated plungers eight to one.

Fig. 6—A Colmonoy-coated pump plunger after 1 year of service handling dilute hydrofluoric acid. The 0.045-in. thick corrosion-resistant overlay increased plunger life by the ratio of six to one.

Patent No. Re20574

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3. Gives longer runs and therefore less pulling cost.
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be Spraywelded for the oil-producing and oil-refining industries.

The coated plunger shown in Fig. 4 has been in continuous salt-water service for 22 months in Oklahoma. Packing maintenance was practically eliminated during the entire period. This plunger replaced equipment that gave a service life of 90 to 120 days and required daily packing-gland maintenance. The plunger has a 3½-in. diameter at the piston and is 1½ in. in diameter at the rod end. A 0.040-in. coating of No. 6 alloy was applied on both diameters.

The Dubbs gasoline pump rod in Fig. 5 is shown after running 24 hours a day for 2 years. The rod is 1½ in. in diameter and has coating No. 6 alloy 0.035-in. thick. Uncoated rods have had a service life of 90 days and require frequent repacking.

A coated plunger that has been in continuous refinery service for more than a year pumping dilute hydrofluoric acid is shown in Fig. 6. This plunger has a 3-in. diameter at the piston end and is 1⅛-in. diameter at the rod end. It is Spraywelded with a 0.045-in. thick coating of No. 6 alloy. Uncoated plungers have lasted from 60 to 90 days in this severe corrosion application.

Maintenance Ingenuity Pays Off in Installing New Boiler Bottom Head

By Frank M. Jenkins

HOW do you put a new bottom head on a 5 by 60-ft. tower? The maintenance department at Pan-Am Southern Corp.'s El Dorado, Ark., refinery did it recently on the gasoline stabilizer of the combination unit. Ordinarily for a job of this nature piping would be stripped from the tower, possibly some structure and landings would be removed, and the tower would be laid over on its side on the ground for the repair. It would be necessary to remove the skirt, cut out and renew the old bottom head, and then replace the skirt. With the tower on the ground, replacing the skirt would be a difficult lineup job, and in addition, laying this tower down would have entailed removing considerable equipment on the ground-piping and several heat exchangers.

Ingenuity pays off . . . Ingenuity in the maintenance department paid off in planning this job. Short lengths of I-beam, with reinforcing gussets, were welded to the base of the tower prior to the shutdown. These beams were spaced to allow removal and replacement of the tower bottom. Also prior to the shutdown the stabilizer tower was guyed for stability with six lines and turnbuckles so that complete control of the stabilizer could be achieved during the raising and lowering of the tower in a vertical direction for repairs.

Jacked up . . . After the combination unit was shutdown, 10-ton jacks were set under the I-beams and the skirt was cut loose from the tower. The tower was then jacked up successfully to clean the bottom. The new bottom was then installed in the tower, first being welded on the outside after which the tower was lowered onto the existing skirt. The stabilizer was then plumbed and welded to the skirt while inside welding of the bottom was being finished. The whole repair job was accomplished in the 3 days available for the job during the shutdown, and cost approximately one-sixth as much as if the bottom had been replaced in the more conventional method.

Author is superintendent of construction and maintenance, El Dorado, Ark., refinery, Pan-Am Southern Corp.

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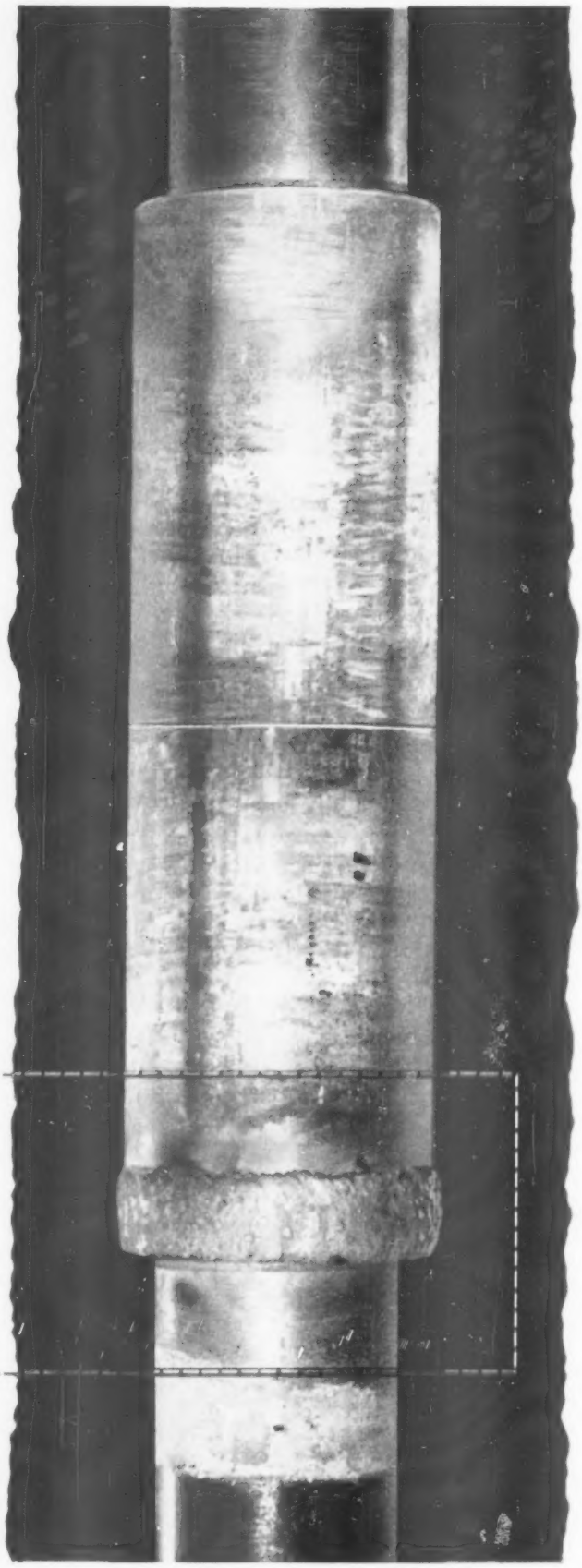

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How to Size Vapor-Relieving Systems—3

by Joseph Conison

DISCUSSION on line sizing, begun in Installment 2, is continued here, with review of the Crocker equation. A new pressure-drop equation is derived which deals with changing pressure, velocity and specific volume of vapors.

A procedure also generally used is to have two separate relieving systems, namely, a high and a low-pressure blowdown system. The low-pressure system will relieve, for example, low-pressure-designed vessels. The high-pressure system will relieve high-pressure-designed vessels. Even though this arrangement will involve two headers, the cost of the two headers may be cheaper in some cases by virtue of being able to divide the vapors rather than to have one common system handle the entire vapor load at a back pressure limited by a low-pressured vessel.

Crocker equation . . . The maximum capacity of any line is limited by the acoustic velocity at the outlet of the pipe and in turn establishes the outlet pressure. The equation developed by Crocker ("Piping Handbook" Sabin Crocker, 1945) for solving the maximum pipe capacity of flowing vapors and gases is as follows:

$$P_t = W/d^2 \frac{(RT/[k(k+1)])^{1/2}}{11{,}400} \quad (5)$$

where:

P_t = terminal or the outlet line pressure, psia.

d = i.d. of line, in.

$R = \frac{1544}{\text{Molecular weight of gas}}$

W = pounds per hour of vapor or gas

T = outlet temperature, °F. + 460

Equation 5 is used to determine the outlet pressure (not to be confused with friction drop) of the pipe with the quantity "W" flowing. If the vapors are discharging to atmosphere, then the outlet pressure of the pipe must be equal to, or greater, than atmospheric pressure. If P_t calculated is less than atmosphere, then "W" can be increased before any effect is made on the back pressure in the line. If P_t calculated is equal to atmosphere, then any increase in "W" will increase the discharge pressure at the pipe outlet; and, if P_t calculated is greater than atmosphere, then it must be added to the line friction loss calculated from the relief valve outlet to the outlet of the header in order to determine the **total** back pressure at the relief valve.

Author is senior instrument engineer with Fluor Corp., Ltd. Paper presented at A.S.M.E. meeting, Los Angeles.

Pressure-drop equation . . . The equations available for the calculation of the pressure drop of compressible fluids, where the velocity is less than acoustic and where the pressure, velocity, and specific volume are constantly changing, are generally tedious to work with. Also, the equations are invariably in terms of initial conditions at the outlet of the valve, which at the start of the calculation are unknown. To simplify calculations, the writer has derived an equation for the calculation of pressure drop in terms of the header outlet conditions and which is based on constant flowing temperature in the line. (Nomenclature is given below.)

At constant temperature:

$$P_1v_1 = Pv = P_2v_2 = RT \text{ Constant} \quad (6)$$

and

$$V/V_2 = v/v_2$$

Squaring both sides:

$$V^2/V_2^2 = v^2/v_2^2$$

Clearing fractions:

$$V^2/v_2^2 = V_2^2v^2$$

but

$$Pv = P_2v_2 \quad \text{from Equation 6}$$

Therefore:

$$Pv/(v^2V_2^2) = Pv/(V^2v_2^2)$$

Canceling:

$$P/(vV_2^2) = P_2/(v_2V^2)$$

and

$$v/V^2 = Pv_2/(V_2^2P_2) \quad (7)$$

Referring to the general energy equation:

$$vdP + VdV/g + fV^2/2gD\,(dl) = 0 \quad (8)$$

And multiplying Equation 8 by $2g/V^2$ results in:

$$2gv\,(dP)/V^2 + 2dV/V + fdl/D = 0 \quad (9)$$

Substituting Equation 7, Equation 9 becomes:

$$\frac{2gv_2}{V_2^2P_2}\int_1^2 PdP + 2\int_1^2 \frac{dV}{V} + \frac{f}{D}\int_1^2 dl = 0 \quad (10)$$

Intergrating Equation 10:

$$[2gv_2/(V_2^2P_2)\,(P_2^2 - P_1^2)/2] + 2\log_e V_2/V_1 + fl/D = 0 \quad (11)$$

In the cases where the line lengths are approximately 200 ft. or more, or where the change in velocity is small, the term $2\log_e V_2/V_1$ can be ignored without appreciable error, so that Equation 11 reduces to:

$$P_2^2 - P_1^2 = -[(V_2^2P_2)/gv_2]\,[(fl)/D]$$

and

$$P_1 = P_2^2 + [(V_2^2P_2)/gv_2]\,[(fl)/D] \quad (12)$$

Substituting density, ρ, for $1/v$ and rearranging Equation 12:

$$P_1 = [(fl\,\rho_2V_2^2)\,(2P_2)/2gD + P_2^2]^{1/2} \quad (13)$$

By inspection of Equation 13, the quantity:

$$(fl\,\rho^2\,V^2{}_2)/2gD$$

is the general equation for pressure drop in pounds per square foot and can be readily determined from conventional charts available in all engineering departments or handbooks. All the gas or vapor terms in the final or pipe outlet flowing conditions are based on the temperature, T_2, calculated from Equation 4 and P_t from Equation 5.

In cases where the line lengths are less than 200 ft., the following formula, incorporting the term $2\log_e V_2/V_1$, should be used:

$$P_1 = [(fl\,\rho_2V_2^2)(2P_2)/2gD + P_2^2 + (\log_e V_2/V_1)\,(2V_2^2\rho_2P_2^2)/g]^{1/2} \quad (14)$$

Nomenclature:

P_1 = initial pressure, lb. per sq. ft.

P_2 = outlet pressure, lb. per sq. ft. (equal to P_t in Equation 5 when P_t = atmospheric pressure or greater)

D = diameter of pipe, ft.

g = 32.2 sq. ft. per sec.

v_2 = specific volume at outlet, cu. ft. per lb.

V_2 = velocity of fluid at outlet of pipe, ft. per sec.

l = length of pipe, ft.

f = friction factor

ρ = density, lb. per cu. ft.

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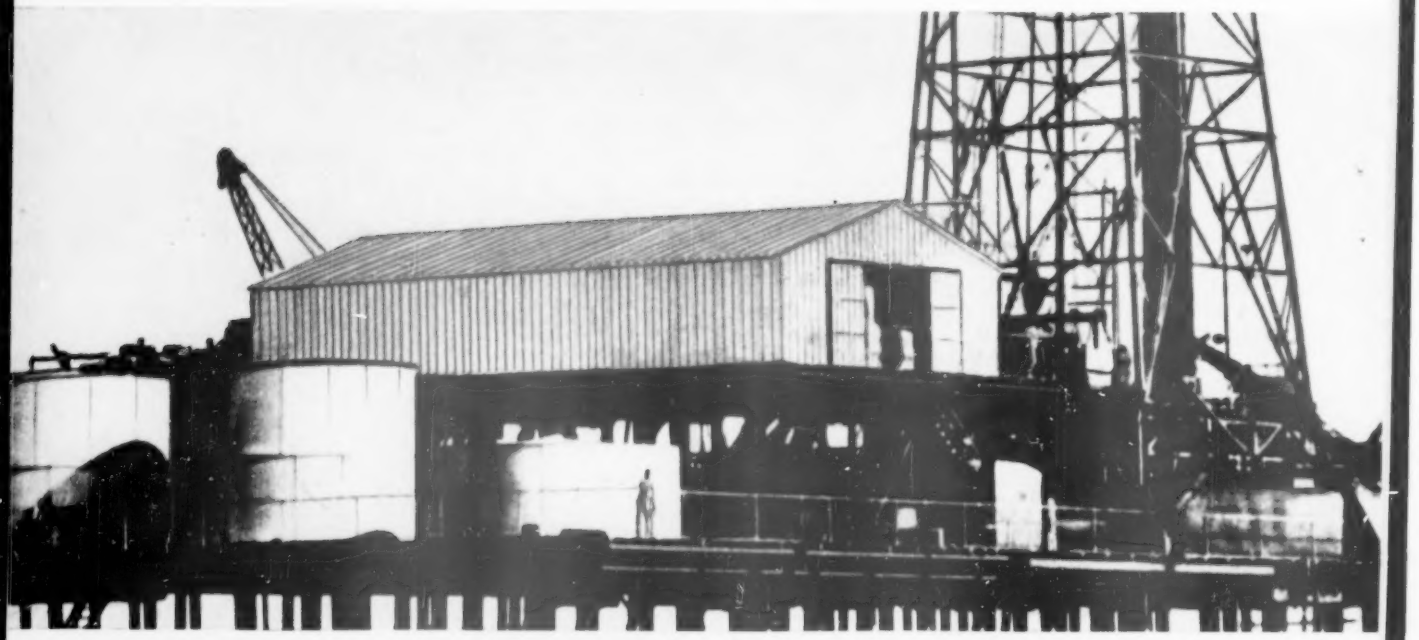

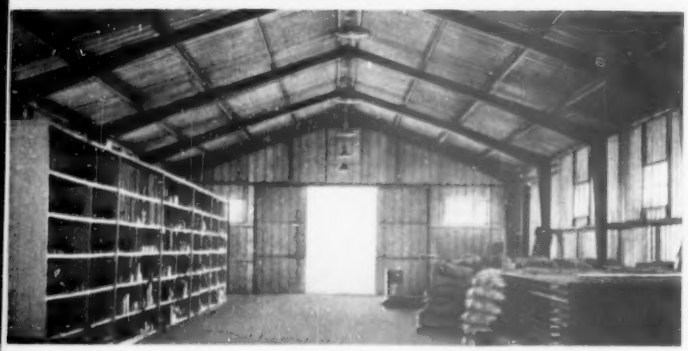

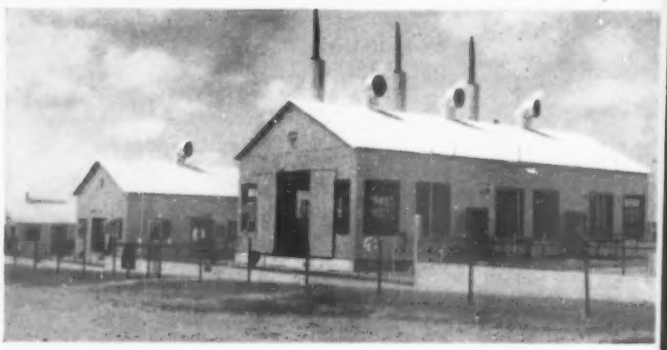

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Low-Temperature Fractional Analysis—1

by J. F. Wilson

THE N.G.A.A. Low-Temperature Fractional Analysis School was set up to minimize human-element errors in fractional analysis. Toward this end the school taught a sound calculating procedure, an accurate and easily reproducible method of receiver calibration, and a method for the determination of vapor holdup. In addition, a modification of the reflux cooling method was developed to eliminate liquid holdup in the Podbielniak automatic and semiautomatic apparatus.

The modified Podbielniak automatic apparatus used at the school consistently yielded analyses with an average deviation from the synthesis composition of less than 0.2 per cent per component on an L.P.G. sample.

Solution of several as yet unresolved problems and further improvement in the accuracy of the low-temperature fractional-analysis method can best be accomplished by an industry-supported research program.

The importance of low-temperature fractional analysis to the petroleum industry is well known. This analytical method has been in use for over 20 years and is particularly satisfying to members of the petroleum industry because of its straightforward character and because it is based upon a technique well known in the industry. Consequently, the results of the N.G.A.A. testing program were rather disturbing.

Deviation . . . For all of the samples studied to date, the mean deviation from the true value, averaged for all components, ranged from 0.55 to 1.04 mole per cent on the various types of samples. Miller,[1] in his summary states, "Major errors are not due to basic procedures or apparatus and are attributed to human element factors such as improper applications, lack of understanding, inadequate training, miscalibrations, etc."

Author is research engineer, Union Oil Co. of California. Paper presented at C.N.G.A. meeting.

N.G.A.A. school . . . As a result of this conclusion, the N.G.A.A. set up a low-temperature fractional-analysis school at University of Oklahoma, at Norman. Nine 3-week classes were conducted at the school from September 1952 through June 1953, with S. T. Preston as the school instructor. The primary purpose of the school was to minimize or eliminate the human-element errors in fractional analyses; however, some added advantages were obtained. Certain school-developed equipment modifications appear to increase the ease and efficiency of fractional analysis.

A great deal of the material covered at the school has appeared in the literature in a series of articles by Preston.[2,3,4] At the present time he is preparing a set of detailed instructions on fractional analysis, and this instruction manual should be ready for publication in the near future. The purpose of the present discussion is to summarize the teachings and findings of the school and to present a short discussion on the present state of fractional analysis from the viewpoint of a recent student of the school.

Error sources . . . Errors in low-boiling-hydrocarbon analysis by distillation may result from unsound calculations, miscalibrations of the receivers, uncalibrated vapor holdup, liquid holdup, manometer errors, or errors in the determination of the vapor-liquid equivalent or molecular weight of the residue from a distillation. The following sections of this paper will discuss these sources of error and the methods developed for their elimination. In addition, a short discussion of reanalysis techniques will be included. The success of the school will be indicated by the accuracy obtained in repeated analyses of an L.P.G. sample of known composition. After a summary of the accomplishments of the school, the paper will conclude with a discussion of the present state of fractional analysis.

Calculations . . . In order to insure that the final reported analysis reflects all of the accuracy of the analytical method, it is necessary, of course, to use accurate and consistent calculating methods. Surprisingly, rather frequently erroneous methods have been used in the past and, as a matter of fact, the first few classes of the school did not calculate compressibility factors correctly.

The chief sources of error were in the handling of the compressibility factors for the components in the receiver system. The instructions with Podbielniak low-temperature fractionation equipment specify certain maximum receiver pressure limits, with the assumption that if these limits are adhered to, the error introduced into the calculations by ignoring compressibility factors entirely will be insignificant. As will be shown later, this is not necessarily true.

Another common error has been the calculation of compressibility factors as functions of the partial pressures of the components in the receiver. The correct method for calculating the compressibility factors is as a function of the temperature of the gas in the receiver, the composition of the gas in the receiver, and the total pressure in the receiver.

References

1. Miller, A. J., Petroleum Engineer, 24, No. 9, C 31 (1952).
2. Preston, S. T., Petroleum Refiner, 32, No. 4, 142 (1953).
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Knock-Test Values of Motor Fuels Hit Record Highs

by O. C. Blade

FURTHER increases of the octane numbers of motor gasolines sold in the United States have resulted in new records of knock-test values for motor fuels of the summer of 1953. National averages of the octane numbers of gasolines for the four last surveys are presented herewith:

	Premium price		Regular price	
	Research	Motor	Research	Motor
Winter 1951-52	90.0	82.0	83.1	78.1
Summer 1952	90.6	82.2	83.6	78.4
Winter 1952-53	90.9	82.7	84.0	79.1
Summer 1953	91.1	82.9	84.2	79.3

A total of 4,421 samples collected from service stations throughout the country were analyzed for the summer 1953 survey by company laboratories under a cooperative agreement between the Bureau of Mines and the American Petroleum Institute. The samples represent the products of 131 companies, large and small, who manufacture and supply motor gasoline.

In addition to octane numbers, tests were made for gravity, corrosion, per cent sulfur, contents of gum and tetraethyl lead, Reid vapor pressure, and distillation temperatures.

The data have been tabulated by groups according to 17 marketing areas (districts) into which the country is divided. The report also contains charts indicating the trends of selected properties of motor fuels over a number of years and a map showing the current sampling locations and the districts.

Table 1 shows by districts the average research and motor-method octane numbers and regular-price and premium-price gasolines sold during the summer of 1953.

Author is petroleum chemist, U. S. Bureau of Mines, at Bartlesville, Okla. Data taken from Bureau of Mines, R.I. 5041, March 1954.

TABLE 2—SUMMARY OF VALUES, MOTOR-GASOLINE SURVEY, SUMMER 1953

	Regular-price gasoline			Premium-price gasoline		
Test—	Minimum	Average	Maximum	Minimum	Average	Maximum
Gravity, °A.P.I.	54.5	60.6	71.1	53.9	60.4	74.2
Sulfur content, wt. per cent	0.009	0.091	0.443	0.008	0.079	0.312
Gum, mg. per 100 ml.	0.0	2.1	10.0	0.3	2.4	7.3
TEL, ml. per gal.	0.44	2.19	3.10	0.00	2.44	3.10
Octane number, Research	76.3	84.2	92.5	83.1	91.1	95.8
Octane number, Motor	72.9	79.3	85.5	79.1	82.9	88.0
R.v.p.	5.4	8.2	11.0	6.1	8.2	10.7
Distillation test, on evaporated basis:						
I.b.p., °F.	87	99	120	89	100	122
5 per cent	100	118	138	102	118	138
10 per cent	114	134	158	111	132	153
20 per cent	133	162	205	127	155	181
30 per cent	147	187	236	143	177	207
50 per cent	168	234	280	157	223	285
70 per cent	193	279	324	175	272	335
90 per cent	258	343	379	223	341	386
95 per cent	306	370	407	280	368	411
End point	334	406	438	318	406	441
Residue, vol. per cent	0.1	0.9	1.2	0.2	1.0	1.4
Distillation loss	0.6	1.5	3.5	0.5	1.4	4.2

TABLE 1—AVERAGE OCTANE NUMBERS BY DISTRICTS, SUMMER OF 1953

	Research		Motor	
District—	Premium	Regular	Premium	Regular
1. **Northeast area:** Me., Mass., N. H., Vt., and northern N. Y.	92.6	87.4	83.0	81.2
2. **Mid-Atlantic Coast region:** R. I., Conn., N. J., Del., Md., Va., central and southern N. Y., and eastern Pa.	92.3	87.3	83.2	81.1
3. **Southeast area:** N. C., S. C., Ga., Fla., Ala., and eastern Tenn.	92.1	86.0	83.3	80.7
4. **Appalachian area:** Ohio, W. Va., western N. Y., western Pa., eastern Ky., and a small portion of Md.	92.0	86.9	83.0	80.3
5. **Michigan**	92.4	86.2	84.0	80.6
6. **North Illinois area:** Northern Ind., northern Ill., eastern Iowa, and Wis.	90.2	83.9	82.8	79.5
7. **Central Mississippi area:** Western Ky., southern Ind., southern Ill., and eastern Mo.	90.5	84.0	82.8	79.2
8. **Lower Mississippi area:** Miss., La., eastern and southern Ark., and western Tenn.	92.2	85.3	83.9	80.8
9. **North Plains area:** Minn., N. D., and S. D.	89.9	84.0	82.7	79.5
10. **Central Plains area:** Neb., central and western Iowa, northwestern Mo., and northern Kans.	89.9	83.4	82.4	78.9
11. **South Plains area: Southern** Kans., southwestern Mo., western Ark., Okla., and northern Tex.	90.8	83.4	83.0	79.2
12. **Southern Texas**	91.2	84.7	84.0	81.5
13. **South Mountain States:** Southwestern Kans., panhandles of Okla. and Tex., western Tex., N. M., Colo., Utah, Ariz., Nev., and eastern Calif.	89.2	81.1	82.3	77.2
14. **North Mountain States:** Wyo., Mont., Idaho, eastern Wash., and eastern Ore.	90.1	81.8	81.7	77.1
15. **Pacific Northwest:** Western Wash., and western Ore.	91.1	82.0	81.8	77.0
16. **Northern California**	91.2	82.1	82.4	77.1
17. **Southern California**	90.8	81.6	82.4	77.1
National average	91.1	84.2	82.9	79.3

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ELECTRIC LOGGING—23

True Resistivity of Beds of Finite Thickness

by R. I. Martin

WHEN thin beds are considered, the effects of the surrounding shales must also be taken into account so that in order to simplify the calculations and also to reduce the number of charts required, it has been assumed that the resistivity of the shale is equal to the mud resistivity. A second limitation is that only the cases of thin individual beds have been calculated. If there is a sequence of thin beds, approximate calculations may be made in another manner.

Departure curves for thin beds are not reproduced here but some of the general features can be shown by referring to Fig. 1, Installment 19, and Fig. 1, Installment 20. Charts for beds of finite thickness are made for the following ratios of bed thickness, e, to hole diameter:

$$e/d = 50, 40, 30, 25, 20, 15, 10$$

and for no invasion, $Di/d = 2$, and $Di/d = 5$. One additional chart has been made for $e/d = 5$ with no invasion.

Because of their thinness these beds will be of critical thickness for some electrode spacings. For example, if $e/d = 20$ and $AM/d = 20$, then AM is equal to e. If AM/d is larger, the bed will be thinner than the electrode spacing. In both these cases the apparent resistivity Ra bears little relation to the true resistivity, and no correction is possible.

On the departure curves, therefore, the values for Rt/Rm will tend to become asymptotic as to the abscissa $AM/d = e/d$ instead of to the ordinates, $Ra/Rm = Rt/Rm$. This is very apparent for high values of Rt/Rm.

In the case of $Rt/Rm = 1$ the curves do become asymptotic to the ordinates if their shape is such that they can do so before the former limitation is imposed. For some other low values the curves are intermediate. In no cases are the curves shown beyond the limit at which their usefulness ceases.

A knowledge of their exact shape is not necessary for values approaching the critical spacing, because the corrections would be so large as to be meaningless.

Although an assumption was made that Rs equals Rm, the curves are still valid even when Rs is greater than Rm provided that the ratio Rt/Rs is higher than a certain value. This limiting value varies with bed thickness, and so is shown on each individual chart.

Inspection of the departure curves shows that for certain cases the resistivity recorded by the long normal ($AM/d = 6$ to 7) is less than 20 per cent different from the true resistivity. These results are summarized in Table 1.

Table 1 shows that the intervals where Rt is approximated on the log are rather broad when e/d is greater than 25, provided that invasion is shallow ($Di/d = 2$). This table applies only to the long normal $AM/d = 7$.

For intervals of Ra/Rm above the intervals, Rt is higher than Ra. If Ra/Rm is below the intervals, Rt is lower than Ra. For those cases where no interval is shown, for $e/d = 20$ or less, Rt is always greater than Ra.

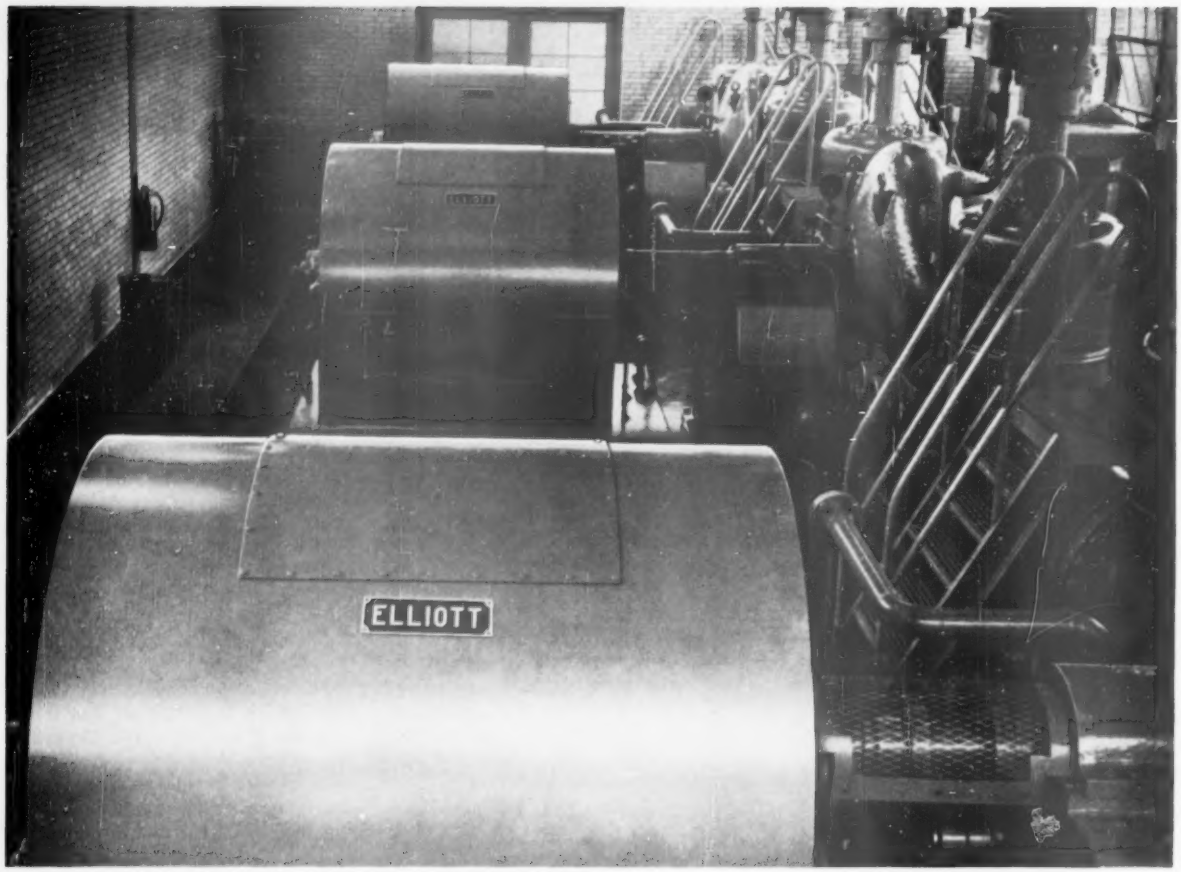
Table 1 may be adapted to cases where Rs is greater than Rm if the limit condition for Rt/Rs is considered. The lower limits shown in the table should be raised according to the figures indicated on the corresponding chart of departure curves.

If, for example, $e/d = 25$, the lowest admissable value for Rt/Rs is 4. Then if $Rs/Rm = 3$, it follows that the lowest permissible value for Rt/Rm is equal to 12. Values corresponding to this are shown on the bottom line of Table 1.

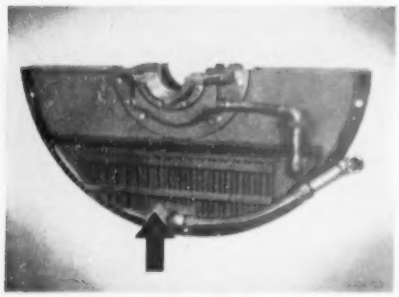
Ri/Rm	6		11		21	
e/d \ Di/d	2	5	2	5	2	5
10	—	—	—	—	—	—
15	—	—	—	About 5	—	4·9
20	—	About 5	—	4·8	4·20	About 20
25	2·80	2·6	2·90	4·15	4·70	15·30
30	2·100	2·8	2·100	4·20	4·105	20·40
40	2·150	2·20	2·230	8·55	4·150	20·70
50	2·150	2·30	2·230	8·55	40·200	30·70
25	12·80	—	12·90	12·15	12·70	15·30

Table 1—For the long normal, $AM/d = 7$, the true resistivity is approximated on the log for rather broad intervals. (Schlumberger Well Surveying Corp. Document 4.)

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.



Sealed air-cooling in these pipe line motors by ELLIOTT



Even the lube oil is air-cooled

No complex water lines are needed here. Incoming ventilating air sweeps past the fins on the walls of the oil reservoir, taking heat with it. The picture is an inside view of a bearing bracket.

The three 2500 hp, 2-pole Elliott motors shown above are driving centrifugal gas compressors in a new mid-west station of a large pipeline company.

These motors are eminently qualified for this service by their rigid fabricated steel construction and careful workmanship. Their modern base-ventilated enclosure, designed on the basis of experience gained with many base-ventilated 2-pole motors in 23 years of pipe line service, seals off all the air from the building and eliminates the need of a separating wall between compressors and motor room. Ventilating air is brought in from the outside through a duct, with connection to the base of each motor. A similar duct discharges the heated air outside.

For full details on these and other Elliott large motors, contact your local Elliott engineer or write Elliott Company, Ridgway, Pa.

ELLIOTT Company

R3-11

TURBINE-GENERATORS TURBINES MOTORS GENERATORS DEAERATING HEATERS EJECTORS CONDENSERS COMPRESSORS TURBOCHARGERS TUBE CLEANERS STRAINERS

by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

Effect of Dewaxing on Viscosity Index

"In the dewaxing of lubricating oils, the viscosity index seems to decrease. Is there any information on this subject?"—W.P.G.

Although nearly every experienced refiner is aware of the fact that the gravity, viscosity, and viscosity index of a raw lubricating oil are decreased by dewaxing, no organized study appears in the literature except the recent data of Dale Tull (master's degree thesis, University of Tulsa, 1953, "A Study of High-Viscosity-Index Oils"). Viscosity indexes as high as 140-165 had been encountered in the raw lubricating-oil fractions of some waxy Venezuelan crude oils and these were investigated to discover the effects of dewaxing. Part of his results are summarized in Table 1.

Tull distilled the 13 Venezuelan crude oils first at atmospheric pressure and then under vacuum to recover the wax or paraffin distillate fraction boiling between 700° and 900° F. The raw or waxy lubricating-oil fractions were examined and then dewaxed to a pour point of about 0° F. His results indicate that the paraffin wax in Venezuelan crude oils has a viscosity index of about 200 (but range of 125 to 288) and a characterization factor of 12.88 (but range of 12 to 13.65). By means of these approximate constants, and if v.i. and characterization factor are additive properties, the decrease in these properties can be estimated for dewaxing operations. Thus, if 20 per cent of wax is removed from a 110-v.i. waxy oil, the resultant oil will have a viscosity index of about:

$$\frac{110 - 0.2 \times 200}{0.8} = 87.5$$

Had the original oil had a v.i. of only 90, the dewaxed oil would have a v.i. of about 62.5.

In analyzing Tull's data, the correlation shown in Fig. 1 was derived. It is based primarily on the behavior of Venezuelan crude oils but the circle points and dashed line are an attempt

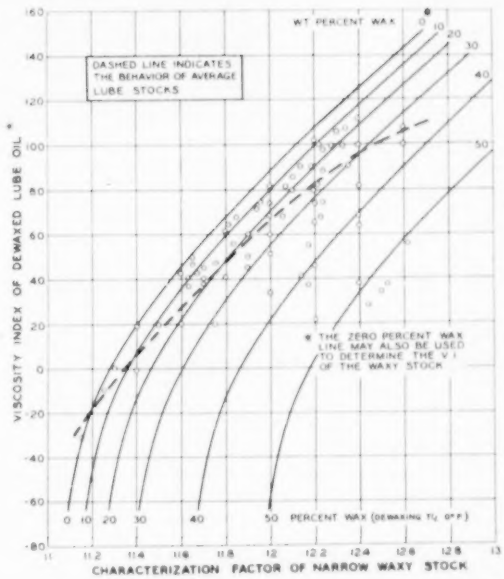

WT PERCENT WAX
DASHED LINE INDICATES THE BEHAVIOR OF AVERAGE LUBE STOCKS
* THE ZERO PERCENT WAX LINE MAY ALSO BE USED TO DETERMINE THE V.I. OF THE WAXY STOCK
VISCOSITY INDEX OF DEWAXED LUBE OIL
0 10 20 30 40 50 PERCENT WAX (DEWAXING TO 0° F.)
CHARACTERIZATION FACTOR OF NARROW WAXY STOCK

Fig. 1—Approximate viscosity indexes of dewaxed lube oils (700°-900° F. boiling range) as a function of the wax content of the raw (waxy) lube stock and its characterization factor.

TABLE 1—WAX CONTENTS AND PROPERTIES OF RAW (WAXY) AND DEWAXED LUBRICATING OIL FRACTIONS OF VENEZUELAN CRUDE OILS (DALE TULL)

	Crude oil			Raw lube oil fraction						
	A.P.I.	Refract. index	Paraffin wax¶ wt. per cent	Volume per cent§	A.P.I.	K	Pour point	Viscosity† at 100° F.	V.i.	Per cent wax‡
Chimire	34.5	1.491	9.65	22.8	28.6	12.17	122	160	72	42.3
Guara	39.3		3.27	15.5	26.6	12.00	99	149	84	21.1
Guere	31.3	1.4903	6.95	22.9	29.5	12.2	117	129	103	30.4
Inca	30.4	1.4978	2.68	15.0	24.1	11.7	89	181	74	17.9
Oficina	29.9	1.4972	6.04	22.8	24.9	11.9	97	182	55	26.5
Ruiz	32.1	1.4862	4.55	16.5	28.7	12.2	96	120	100	27.6
San Roque	54.5		0.89	1.6	34.1	12.44	115	81	136	55.6
Sibucara	36.0	1.4820	4.77	19.9	29.7	12.24	83	106	93	24.0
Tabascana	33.3	1.4961	10.56	26.9	28.2	12.14	123	145	108	39.2
Yopales	23.0	1.5077	2.7	21.0	21.5	11.63	84	330	54	12.9
Guario§	50.0			3.7	32.2	12.4	94-128	70	138	‖49.0
San Joaquin	44.0			14.8	32.8	12.5		121	134	‖52.0
Tia Juana (102)	25.5	1.5052		20.0	21.7	11.65	—15	245	59	

	Dewaxed lube fraction					Wax	
	A.P.I.	K	Pour point	Viscosity at 100° F.	V.i.	V.i.	Calculated char. factor
Chimire	22.3	11.69	1	219.2	55	*202	13.1
Guara	22.8	11.72	3	190.2	51	*180	13.04
Guere	20.2	11.53	0	212.1	43	*288	13.65
Inca	21.7	11.64	0	221.7	45	*217	12.00
Oficina	21.7	11.64	—3	184.8	45	*125	12.65
Ruiz	24.2	11.83	7	146.4	65	*187	13.18
San Roque	20.8	11.44	3	156.9	28	*285	13.23
Sibucara	26.7	12.02	5	112.2	75	*190	12.89
Tabascana	21.3	11.60	5	236.9	41	*241	12.98
Yopales	20.3	11.54	—17	258.5	41	*128	12.10
Guario§			5		64	180	
San Joaquin					34	184	
Tia Juana (102)							

*Calculated, assuming v.i. is an additive. †Extrapolated from viscosities at 130° and 210° F. ‡Obtained when dewaxing to about 0° F. §700°-900° F. boiling range except Guario which had a boiling range of 700°-850° F. ¶Only the wax contained in the 700°-900° F. fraction. ‖Estimated.

Questions on Technology (Continued)

to discover the behavior of average crude oils. The dashed line is the data of J. B. Maxwell ("Data Book of Hydrocarbons," page 12, D. Van Norstrand Co., New York, 1950) and the circle points are approximate data taken from literature. Maxwell's line is probably a good average because the results reported in the literature often pertain to or are studies of oils of unusually high wax contents.

The figure is based primarily on waxy fractions boiling between 700° and 900° F., but it is believed that it can also be used with fair accuracy for residual stocks (700° F. and up) because wax, either paraffin or microcrystalline, is distributed somewhat evenly throughout the entire high-boiling range of crude oils. The percentage of microcrystalline wax is often a little lower than the percentage of paraffin wax.

How Transportation Costs Compare

"Are tanker transportation costs always less than by other means of transportation?"—M.H.G.

Under almost all conditions, transport in tanker vessels is cheaper on a distance basis than other means of transport. The only possible competitors are (1) large-diameter long pipe lines or (2) large-scale barge operations. Under present conditions in the United States (or conditions prevailing during the last 15 years) the cost of oil transportation relative to cost of ocean transport has been about:

	Approx. average	Range found
Ocean	1.0	1.0
Barge	1.6	1.5-2.0
Pipe line	2.2	1.2-7.0
Railroad	*8.0	*7.0-*14.0
Truck	35.0	27-high

*Not based on crude-oil rates. Rates for crude oil would probably be much lower.

Current literature indicates somewhat the same:

	Pew*		Pogue†	
	Cents per ton-mile	Ratio to railroad equals 8	Cents per ton-mile	Ratio to railroad equals 8
Railroad tank car	1.64	8.0	0.83	8.0
Pipe line:				
General			0.32	3.17
Crude oil	0.48	2.34		
Products	0.53	2.58		

*J. Howard Pew, testimony before TNEC hearings of U. S. Senate (p. 7178, Part 14). †J. E. Pogue, "Economics of the Petroleum Industry," Chase National Bank, 1939.

An extensive search of the literature indicates the transportation costs shown in Table 1. Consideration of the many variables that are involved in transportation costs, indicates clearly that data such as those in Table 1, can only be an approximation.

Note especially that Table 1 compares the cost of transportation for equal distances of transport. Thus, pipe-line transportation from Texas to New York may be cheaper than the very much longer sea route involved in sending oil to the Gulf of Mexico by pipe line and then around the peninsula of Florida by tanker to New York.

TABLE 1—APPROXIMATE COST OF TRANSPORTATION OF OIL AND COAL

	Cents per bbl.-mile	Cents per long ton-nautical mile
Ocean:		
Gasoline	*0.037	0.37
Crude oil	0.019	0.16
Bunker C fuel	0.022	0.16
Coal	†0.037	0.32
Barge:		
Gasoline	‡§0.055	
Bunker C	‡0.038	¶0.24
Coal	†0.056	0.48
Pipe line:		
I.C.C. average	0.065	
Crude oil	0.04-0.137	
Products	0.046-0.147	
Railroad:		
Gasoline or lubes	‡0.265	
Dist. and residues	‡0.275	
Coal	0.2-†0.45	¶1.1-2.5
Trucks:		
Oil (bulk)	1.0-1.7	

*Assumed to be 2.3 times the rate for dirty Bunker C fuel. †Computed for comparison from the ton-nautical mile rate. ‡Very few data. §"Clean" rate assumed to be twice the "dirty" rate. ¶On a statute mile rather than nautical mile basis, and a short rather than long ton.

Tower Works With Upset Trays

"In inspecting out topping unit, we found several trays that had been upended at some time during the operations and the caps were scattered about. It apparently had operated just as efficiently as at any other time. How can a tower operate with the trays on end?" R.E.G.

For many years the editor of this page has related a similar story to his students at University of Tulsa and has always suspected that they did not completely believe the story.

It is not uncommon to encounter tower explosives that damage trays or dislodge caps. This occurs mainly by the suddent introduction of water, rather than oil, into a hot tower or by a pocket of water shielded by oil-water emulsion that suddenly becomes mixed into the main bulk of hot oil.

Regarding the comment on satisfactory operation, there are two arguments that support such a contention. First, it must be recognized that a bubble plate is not an ideal form of contactor, that in fact a random arrangement of contacting surface such as in a packed tower can be as efficient or more efficient than a bubble-tray type of construction. Towers or plates that have undergone an explosion can present such a random arrangement, and as long as the sidedraw pots are operable or are supplied with an adequate amount of liquid, the tower can function normally. Obviously, the plates, caps, and debris must not fall completely to the very bottom of the tower. Bubble-plate constructions are employed mainly because they are relatively cheap compared with packed tower constructions.

Secondly, the fractionation between products in a topping tower is very little indeed—so little that one can scarcely distinguish by A.S.T.M. distillations curves between products produced by two, three, or four theoretical plates. The degree of fractionation is further confused by the use of stream strippers. Accordingly, although the tower may have functioned less effectively after the tower explosion, it would probably have produced products that were so similar to the products made in regular operations (with the plates properly in place) that one would have difficulty in distinguishing between the products before and after the explosion.

2. How to Improve Cooling-Tower Water-Supply Treatment

. . . with automatic control

by J. W. Segraves

TO replace water lost by blowdown, evaporation, and windage, a Honeywell float-type liquid level controller and stabilized pilot assembly pneumatically controls diaphragm motor valves on water influent lines. At Tinker air base there are two sources of makeup water: water from the air-field distribution system and water diverted from another process. A 3 to 15-psi. air signal from the liquid-level controller actuates a three-way valve so that the water from the second cooling system is used as makeup water, with raw water used only when the primary supply is inadequate.

In command of this system is a graphic panel. This is a cubicle tube of instrument panelboard containing all of the instruments except the liquid-level controllers. A portion of the cooling water flows from the 42-in. cooling-water main through a 3-in. bypass line, to the cubicle and through the measuring cells which are easily accessible for inspection and maintenance. The complete cooling-water system is represented graphically on the front of the panel by raised lines and symbols of different colors, and the measuring instruments are located in the flow lines in their proper location so that their function is immediately apparent. All instruments are designed so that any or all variables can be manually controlled at any time.

Author is industry engineer, Minneapolis-Honeywell Regulator Co.

Physical Layout Problem

The Tinker cooling-water-treatment system presented a difficult control instrumentation problem in that the cooling tower was located approximately 1,000 ft. from the instrument control room, while the only available storage space for a year's supply of sulfuric acid and sodium dichromate was at the cooling tower. Proportioning pumps had to be located at the tower, but the bypass water sample line had to be taken off the main near the instrument control room.

In order to eliminate to a great extent the lag in the control system introduced by the measuring units being 1,000 ft. downstream from the point where the acid and dichromate are added to the water, the 3 to 15-psi. air signals from the electronic potentiometers are converted by pneumatic-electric relays to electrical signals which control the pump speeds through the Thymotrol units. The instrumentation thus combines the advantages of simplified automatic reset and adjustable throttling action, available with pneumatic controls, with the speed of electrical transmission.

Signal lights are located on the control panel to indicate water level and sources of makeup water. In addition, an auxiliary control panel is located in the pump house and, when necessary, it permits an operator to adjust manually the makeup valves and the pumps from a position near the cooling tower as well as from the instrument control room.

Completely automatic control systems for cooling water treatment are a present-day reality for conserving water and reducing to a minimum, maintenance, chemical, and replacement costs inherent with normal cooling-tower operation. These systems permit appreciable savings in operating costs because they eliminate the damage that would result from intermittent manual control with its wide fluctuations in pH, inhibitor concentration, and dissolved solids concentration. Design engineers at Tinker expect the system, including the panelboard, to amortize itself in at least two operating seasons. Tests are to be made to evaluate the duct transfer efficiency under the new system in comparison with that resulting from manual treatment; however, no figures are available at this writing.

The automatic control system is safer in that it reduces handling of dangerous chemicals and allows better admixing of concentrated chemicals with the cooling water thus eliminating damage to equipment such as concentrated acid attacking concrete pillars in water towers. Its advantages are further emphasized when one considers that there are about 25,000 cells in operation in this country with capacities over 1,000 g.p.m. per cell, a majority of which require water-treatment facilities.

Fig. 1—Graphic control panel for the recirculated cooling-tower treatment system.

EQUIPMENT MEN . . . in the News

Cummins Engine Inaugurates Conveyor-Type Assembly

With the press of a button, Robert E. Huthsteiner, president, Cummins Engine Co., Inc., Columbus, Ind., started the firm's new conveyor-type production line. The 300-ft. line is part of the company's seven-million-dollar postwar expansion program. Assembly operations on this line are conducted in a new building. Pictured above witnessing this advancement in the company's quality control program are: Irwin Miller, chairman of the board; B. L. Wright, general foreman of engine assembly; C. R. Fox, vice president, manufacturing; and Robert E. Gordon, editor, Columbus Evening Republican.

Well Equipment Transfers Meeks to Hobbs, N. M.

William C. Meeks, Jr., representing Well Equipment Manufacturing Corp., has been transferred to Hobbs, N. M., from Russell, Kans., where he has been representing the company for the past year and a half.

Meeks has had many years' experience in oil industry sales and engineering. He will serve the industry's requirements for Weco unions and Chiksan products throughout Southeast New Mexico and part of West Texas.

Chicago Bridge & Iron Sends Thomas to Tulsa

Quinton Thomas has been transferred to Chicago Bridge & Iron Co.'s Tulsa sales office. Thomas started with Chicago Bridge & Iron in 1948, and worked in its Birmingham plant, Chicago general sales office, and Birmingham sales office before being transferred to Tulsa.

He was graduated from Alabama Polytechnic Institute in 1948 with a B.S. degree in mechanical engineering. At Tulsa, he will assist E. P. Shelton, manager, and R. E. Morris and R. A. Johrde, contracting engineers.

Pipe Fabricating & Supply Names Philp Chief Engineer

Floyd Philp has been appointed chief engineer of Pipe Fabricating & Supply Co. in Compton, Calif.

He has been associated for the past 28 years in the design, fabrication, and erection of piping systems for natural-gasoline, petrochemical, and power plants. Philp started in petroleum refinery engineering in 1926 with Union Oil Co. of California. In 1929, he entered the engineering department of C. F. Braun & Co., Alhambra, Calif., where he remained for 7 years.

He spent 7 years with Bechtel-McCone-Parsons Corp. in Los Angeles. Philp has also been with Petroleum Engineering, Inc., Tulsa; Cities Service Co. of New York; The Ralph M. Parsons Co. of Los Angeles, and recently with Bechtel Corp., Los Angeles office.

Wilson to Distribute Carter Hydraulic Pumps

S. C. Carter Co., Inc., Los Angeles, manufacturers of long-stroke hydraulic pumping units, has announced the appointment of Wilson Supply Co. as distributors for the states of Arkansas and Louisiana.

Wilson Supply, which already distributes Carter units in South Texas, will handle sales and service in its new territory from its offices at Harvey, Houma, Lake Charles, New Iberia, and Shreveport, La. Don C. Lawrence, of Wilson Supply, has been designated to handle the Carter line with headquarters at Shreveport.

Maloney-Crawford Makes Sellars Chief Engineer

A. I. SELLARS

Arnol I. Sellars, former assistant chief engineer of Maloney - Crawford Tank & Manufacturing Co., has been appointed chief engineer, according to S. P. Wallace, president.

Sellars replaces Sam Wilson. He obtained his schooling at University of Tulsa, and has spent the past 7 years working with oil-field equipment.

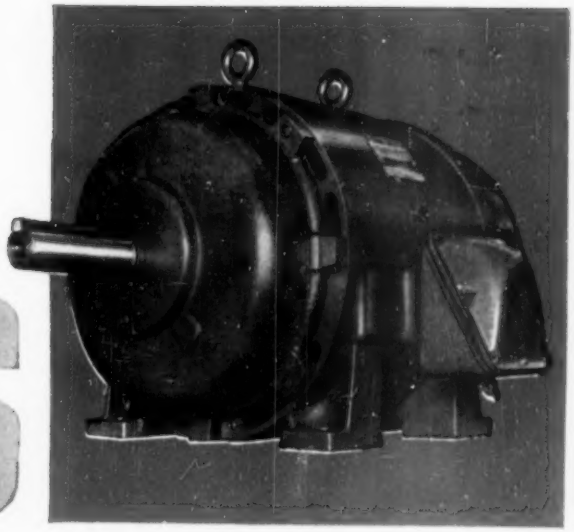
Stevenson Joins Continental As Tubular Engineer

I. M. STEVENSON

John M. Stevenson has joined The Continental Supply Co. as tubular engineer. In announcing the appointment, J. A. Mussler, general manager of sales, stated Stevenson will be primarily concerned with technical problems on line-pipe and oil-country tubular goods.

For the past year Stevenson has been chief engineer, oil-field products, with United Machine Co., Fort Worth. The 3 previous years were spent with The Youngstown Sheet & Tube Co. as development engineer on pipe-line prob-

"ALL MOTORS ARE NOT ALIKE!"



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STRATAFRAC

EXCLUSIVE DOWELL SERVICE COMBINES

Case histories show production increases from wells completed in many kinds of formations

Stratafrac* is an exclusive Dowell service that fractures and acidizes formations in one operation. It is designed to extend existing fractures and create new ones.

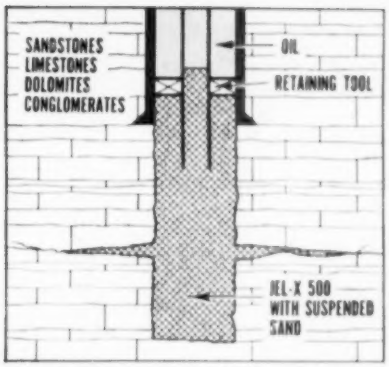
These case histories are a few examples from thousands of jobs where Stratafrac treatments increased production. A well completed in a sand formation jumped from 48 to 624 BOPD. Production from a well in a chat was increased from 1 to 264 BOPD. Production was raised from a show to 210 BOPD from a dolomite pay. And a gas well went from 4,000 MCF to 53,500 MCF.

Stratafrac has proved to be an efficient method of increasing production from sandstone, chat, conglomerate, limestone and dolomite formations not adaptable to conventional acidizing.

In Stratafrac treatments, a mixture of sand and Jel X 500 (a vis-

DOWELL SERVICE

Especially designed Dowell trucks are used to transport the sand-carrying gel used in Stratafrac treatments. The heavy-duty pumps are designed for high-pressure, high-volume injection. Such equipment has helped Dowell engineers perform thousands of fracturing treatments with profitable results for oil operators.



Specify Stratafrac—to dissolve soluble materials in formations . . . to enlarge old fractures and open new ones . . . to carry sand into fractures as an abrading agent.

Stratafrac requires no work-over rig. High-pressure lines are hooked directly from pump truck into tubing at well head by experienced Dowell engineers.

ACIDIZING AND FRACTURING

cous, acid-kerosene gel) is pumped into producing formations to create lenses of artificial permeability. The acid concentration and the size and amount of sand employed in Stratafrac can be varied to fit formation characteristics. A recent trend in fracturing has been the development of batch treatments—a fine grain sand followed by a coarse grain sand.** Dowell's complete control of all phases of this operation assists in the creation of larger ultimate fractures, giving better fluid drainage.

For complete information on Stratafrac, and the many other Dowell services developed for the oil industry—such as Acidizing, Perfojet, and the Electric Pilot—contact your local Dowell Station. Or, if you prefer, write directly to Dowell Incorporated, Tulsa 1, Oklahoma, Dept. C-11.

*A service mark of Dowell Incorporated
**U. S. Patent No. 2,354,570—licensed only to Dowell Incorporated

This is Jel X 500, used in Stratafrac. This viscous fluid holds sand in suspension, in ratios up to 7 lbs. per gallon, predetermined to meet formation characteristics. No gel-breaker solution is required.

—chemical service for the oil industry

DOWELL

lems. His experience also includes tubular goods research with Phillips Petroleum Co.

Stevenson, who will work out of the Dallas office, graduated in 1937 as a mechanical engineer from Texas A. & M. College.

O'Brien to Manage Oilwell Fort Worth Office

Promotion of J. D. O'Brien to manager of Oil Well Supply's area sales office at Fort Worth has been announced by V. J. Waters, manager of the Central Midwest area. He succeeds Byron Post, veteran Oilwell employe who is retiring.

J. D. O'BRIEN

RALPH CROWE

O'Brien has been city representative at Fort Worth since 1947. He joined Oilwell in 1946, and was employed at its home offices in Dallas prior to moving to Fort Worth.

Ralph Crowe, manager of Oilwell's branch store at Wichita Falls, has been named to fill O'Brien's former post. The new city representative joined Oilwell at Anson, Tex., in 1944 and served as store manager there and at Greggton and Snyder, Tex., prior to his appointment to the Wichita Falls store in 1952.

Vinson Begins Operations In New Warehouse Plant

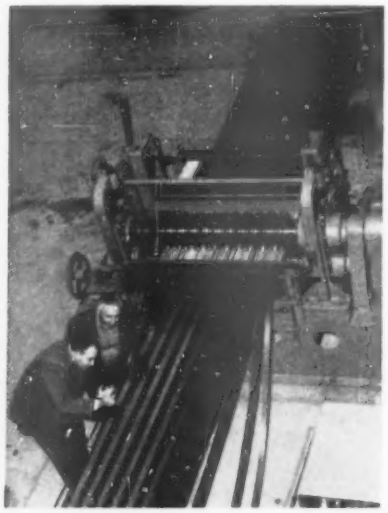
The largest plant of its type in Texas, Vinson Supply Co.'s new $1,500,000 steel warehouse in Dallas is now complete, G. B. Lane, executive vice president of the company, announced.

The plant, an all-steel structure, provides 110,000 sq. ft. of warehousing floor space with an additional 11,000 sq. ft. of office space under construction.

One feature of the new plant is the first 48-in. coil slitting line in the Southwest. The line reduces metals in coil form to slit coils in specified widths.

In addition to the slitting line, Vinson has added a roller leveler and sheet cutup line, which is able to produce flat sheet from coils in either aluminum or steel in lengths from 48 in. to 18 ft.

The new warehouse carries a full line of steel and aluminum stocks, and has increased capacity shearing, power hacksawing, and torch cutting equipment.



First coil slitter in the Southwest is now in operation at Vinson Supply Co.'s new Dallas warehouse. Above, Fred Bush, Vinson's sheet and strip division manager, and Harry A. Yanof, president of Hemsy Stamping & Manufacturing Co., examine the first 20-gage steel strip produced on the coil slitter. The Hemsy firm purchased the first 16-gage slitted coil turned out by the machine.

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FRANK WHEATLEY'S
SYNTHETIC RUBBER SEAL
A FULL PIPE OPENING HORIZONTAL SWING CHECK VALVE
Sizes: 2" to 24"
Pressures: 125# WP to 1800# WP
Ends: Flanges, Screwed, weld
Steel · Iron · Bronze · Aluminum
Equipped with Wheatley Synthetic Seal—a synthetic rubber ring dovetailed and fitted into a removable bronze seat, also dovetailed to accept this rubber ring. When the bronze clapper falls against this rubber, a perfect seal is formed regardless of what irregularities have deposited on the seat or in the fluid, such as sand, scale and cutting which under pressure ordinarily would completely cut out a hard-surfaced seat.
SINCE 1916
SPECIFY FRANK WHEATLEY — THE GENUINE . . .
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Bovaird Announces Sales Organization Changes

R. W. ROBBINS

YOUNGLING

Bovaird Supply Co. has announced important changes in its Kansas organization. The Kansas district office, which has been at Great Bend for 5 years, is being transferred to Wichita, according to R. E. Batchelor, general manager of stores.

Bovaird district manager for Kansas, R. W. (Bob) Robbins, is now stationed at Wichita. Robbins has been with Bovaird for the past 25 years, working in various stores in Oklahoma and Kansas.

At the same time, Bovaird has announced a new city sales representative in Wichita. J. W. Youngling, formerly store manager and field salesman at the Clay City, Ill., store, will succeed the late T. A. Mallisee. Youngling has been with Bovaird for 6 years, all of his previous service having been in Illinois.

Orbit Valve Transfers E. N. Stone to Denver

E. N. STONE

Earl N. Stone, who has been Kansas representative for Orbit Valve Co., Tulsa, since May 1952, was recently transferred to Denver, according to R. G. Cole, general sales manager.

Stone will represent Orbit in the oil fields of Colorado, southern Nebraska, Utah, and northern New Mexico. He is a graduate of Oklahoma University.

Lane-Wells Awards Three Fellowships

Three more young men have been awarded fellowships by Lane-Wells Co. as part of the company's scholastic program to aid promising students in petroleum engineering.

Terry W. Spencer, of San Gabriel, Calif., is taking advanced studies at California Institute of Technology on the second year of a Lane-Wells fellowship. Spencer, who is specializing in geophysical work, attended U.C.L.A. and M.I.T., before taking his graduate work at Cal. Tech.

James L. Sanderlin has a Lane-Wells fellowship at Texas A. & M. Sanderlin is also a graduate of Texas A. & M.

Frederick P. Foy, Jr., a graduate petroleum engineer from University of Southern California, has put in a year in the oil fields as rotary helper and as mechanical engineer's helper. He has returned to U.S.C. for further study on a Lane-Wells fellowship.

Fellows Made Sales Manager by Wisconsin

Phil Norton, vice president in charge of sales for Wisconsin Motor Corp., has announced the appointment of Ray J. Fellows as sales manager and J. W. Perschbacher as assistant sales manager.

Fellows, who has been with the company since 1938, has served in the capacity of assistant sales manager during the past 6 years.

Perschbacher has represented Wisconsin Motor in various territories since 1947.

Number ONE on the hit parade.
McKISSICK
TRAVELLING BLOCK
for superior performance
Center plates support pins between each sheave. Divider plate between each sheave minimizes center pin deflection.
Heavy steel construction throughout for extra weight.
All McKissick blocks are equipped with Johns-Manville Klipper Seals.
READILY ADAPTABLE TO ALL POPULAR HOOKS
(Illustrated is McKissick block with Webb-Wilson Hook)
Hydra Hook
McKISSICK
McKISSICK PRODUCTS CORPORATION
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Complete Protection... Solid Comfort... Rugged Wear!

GOODALL
BOOTS AND CLOTHING

Goodall work clothing and footwear are made to specifications assuring the utmost in protection, comfort and wear-resistance. Their long-established reputation for quality and value should recommend them as your *first choice* for all plant and laboratory needs.

"TOE-SAVER" ® SAFETY BOOTS

The ultimate in protective footwear—famous for comfort, durability and the positive protection provided by the flanged steel safety toe box, tested to withstand 2,000 lbs. pressure. Grid-tread soles are long-wearing and guard against slipping on wet surfaces. Short, three-quarter and full-hip lengths.

OIL-RESISTANT BOOTS

Maroon neoprene latex, duck lined, with black neoprene cleated soles and heels. Cush insole for extra comfort. Short only, with or without "Toe-Saver."

COATS, JACKETS, OVERALLS, SUITS

Rubber or neoprene. Durable, full-cut garments in a variety of styles to meet every requirement or preference. Reinforced where extra strength is needed, without impairing comfort. Made with the care that assures extra value.

APRONS . . . "Long-Life" Neoprene Latex Aprons, providing excellent resistance to oils, grease, acids, water. Yellow or black. Other aprons in rubber surfaced, rubber latex and oiled.

GLOVES . . . "Goodall" Synplastic Gloves with super-resistance to oils, rubber-solvent chemicals and acids. Extremely tough, light in weight, flexible. Carefully made and actually shaped to the hand, with curved fingers and thumbs.

HATS . . . "Hardboiled" Safety Hats, in fibreglass or aluminum. Other hats—rubber, neoprene or oiled—in variety of styles.

Contact our Nearest Branch for Further Details and Prices, Ask for Clothing Catalog

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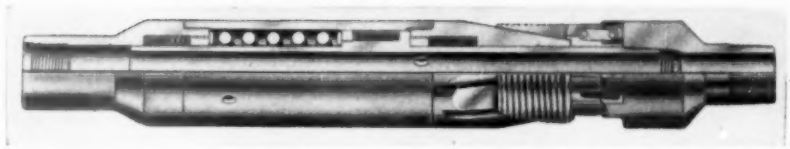
. . . What's New in Equipment?

Use the handy Time-Saver Cards ✔✔✔ to obtain additional information on these items

by Dan B. Miller



Tool Is for Acidizing, Fracturing, Flooding

American Iron Packer Holddown, Type HD is a tool used to hold the packer in place in those applications where the pressure under the packer is considerably greater than the pressure above. It is especially recommended for high pressure acidizing, formation fracturing, and water flood input wells.

When running this tool, it is placed directly above the packer, and the packer run in the normal way. When the packer is in position, it is set, and as the tubing weight is placed on the packer, the holddown is set. As the pressure differential is built up from below, the packer has a tendency to raise. Any upward force of the packer is transmitted against the holddown slips wedging them between the slip mandrel and the casing. Since these slips have teeth on the external surface, they will take a bite in the casing, preventing any upward movement.

In addition to the mechanical holding, this tool is designed with a hydraulic holding device. Inside the tool is a hydraulic piston attached indirectly to the slips. As the pressure inside the tubing is built up, an upward force is created on this piston, pushing the slips upward. This same pressure is exerted against the top of the slip mandrel. The combination of these two forces creates a wedging action of the slips against the casing. *American Iron & Machine Works Co.*

Check No. 1 On The Time Saver Card

●

Internal Fins Increase Tubing Surface Area

One of the new types of products made possible by extrusion is tubing with special shapes. Of particular interest to design engineers associated with problems of heat transfer is tubing with integral fins on the inside surface.

One of the most important factors in heat transfer is surface area. With fins on the inside or outside of tubing, the surface area is greatly increased thus permitting a greater transfer of heat in a tube of a given length and diameter. Tubing with internal fins, shown in the illustration, was produced of a special heat-resisting stainless steel. It is used in a heat exchanger with fire on the outside and gas on the inside. Similar tubing can be produced of a number of steels in a limited size range. *The Babcock & Wilcox Co.*

Check No. 2 On The Time Saver Card

●

New Down-Hole Pump Is Adaptable to All Wells

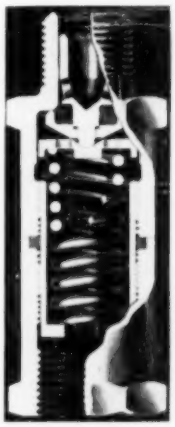
Hydraulically operated down-hole pumping unit combines efficiency of operation with economy and low maintenance. The pump consists essentially of a standard production pump coupled to and driven by a hydraulic engine valve. The unit is energized by crude oil under pressure which is furnished by any suitable prime mover at the surface.

While it was originally designed for whipstocked or extremely crooked holes, the rodless pump provides advantages for all types of wells, both deep and shallow. It permits the installation of a power unit having a maximum lift area in production tubing of a given internal diameter. For a given pumping depth and production capacity, a minimum operating pressure is required. The design and incorporation of standard rod pump ideas facilitate service maintenance. *Sargent Engineering Co.*

Check No. 3 On The Time Saver Card

●

Relief Valve Construction Eliminates Pilot Operation



Compact, lightweight construction, made possible by the in-line design, contributes to the ease of mounting the Circle Seat 5100 relief valve. Adjustment of cracking pressure within ±15 per cent of nominal can be made by using a standard Allen wrench to rotate the threaded spring retainer. Interchangeable replacement springs can be used to provide a wider range of adjustment. In-line construction provides excellent flow characteristics without pilot operation.

The performance curve shows a slight, but regular increase in pressure drop with increasing flow rate, which serves to stabilize the action and impart smooth, quiet, chatter-free operation. The use of an O-ring seal and a spring centering device, which allows only axial force to be transmitted to the poppet, results in sensitive operation and high durability. The valve exhibits

What's New... Use the handy Time-Saver Cards

no leakage within as little as 2 per cent of the preset cracking pressure and reseats with no leakage within as close as 5 per cent of the setting.

It is available in either steel or brass for pressures from 50 to 1,000 psi. with male inlet and female outlet pipe threads. Sizes ¼, ½, ⅜, and 1 in. can be supplied in stainless steel with Teflon seal suitable for virtually any difficult service. *James-Pond-Clark.*

Check No. 4 On The Time Saver Card

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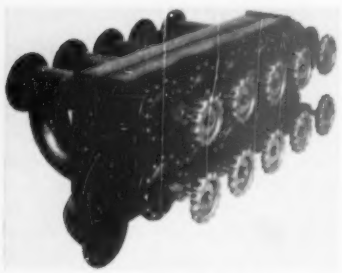


Fabricated Manifolds Give Greater Flexibility

Warren Dual Manifolds provide the greatest flexibility in piping arrangements for carrying split loads and for decreasing unloading time. They are available in both cylindrical and square design.

The dual design achieves all operating objectives, making it possible to unload two compartments at one time without danger of mixing; to meter out from either manifold, or to gravity out through one manifold while metering through the other; to discharge any or all compartments through the top manifold, or any or all compartments through the bottom manifold, making it unnecessary that the different grades of products be loaded in any specific compartment sequence; to unload with two hoses when compartments are loaded with one product, and to accomplish all of this with higher rates of flow and with complete drainage of the manifolds with minimum valve manipulation. *Betts Machine Co.*

Check No. 5 On The Time Saver Card

●

Makes Tests at Any Level Without Tail Pipe

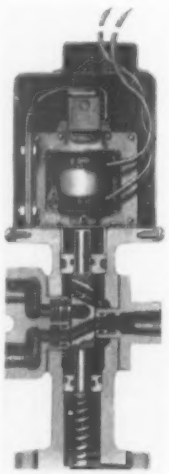
Selective Tester is a new piece of equipment that permits the making of selective zone tests. Of high interest to drillers is the fact that the new discovery permits those tests to be made without use of tail pipe sections, thereby eliminating considerable man-hours of time.

The equipment tests more than one zone with a single trip in the hole, reduces cost and hazard of setting on cement plug, permits evaluation of zones passed up while drilling, and pin points gas/oil and water/oil contacts. *Johnston Testers, Inc.*

Check No. 6 On The Time Saver Card

●

Shear-Seal Valve Is Not Critical to Foreign Matter



This new series of Shear-Seal solenoid valves is designed for 0 to 250 psi. oil service in industrial application. These valves are not critical to pipe scale or other foreign material in the liquid, because the lapped sealing members are in constant intimate contact.

Square corner wiping section of the Shear-Seals pushes dirt aside and lets it flush out through the return port. No eroding or scoring occurs because flow is through the sealing members and never across the sealing surfaces.

Shear-Seals are self-lapping and wear compensating, and therefore the sealing qualities of the valve improve with use. Pipe sizes available are ¼, ⅜, and ½ in., in four-way, three-way, and shutoff models for 110, 220, or 440 volt a.c. *Barksdale Valves.*

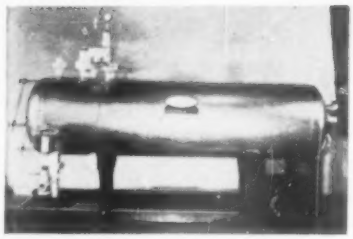
Check No. 7 On The Time Saver Card

●

New Unit Will Remove Free Water From Crude

The Model 36WK-0212S Free Water Knockout will efficiently remove free water from crude oil. When a well is producing enough water to overload the oil-handling equipment, one of these units can be installed in the system to remove the free water and discharge it into a disposal pit or well. The oil and gas can be discharged from the unit separately or together as desired.

The unit pictured is 36 in. o.d. by



12 ft. seam to seam by 230 psi. water. With the liquid 24 in. deep in the vessel and the remaining space for gas, with a liquid retention time of 5 minutes, this unit will handle 2,600 bbl. per day of total liquid. This capacity can be divided up between the oil and water as conditions require. The simultaneous gas capacity of the unit operating at 125 psi. is 2.7 M.M.c.f. per day.

Free Water Knockouts are available in both horizontal and vertical models and in any size and working pressure required. They can be installed at the well head on gas lift wells to reduce the back pressure on the well and thereby increase production. *Oil Metering & Processing Equipment Corp.*

Check No. 8 On The Time Saver Card

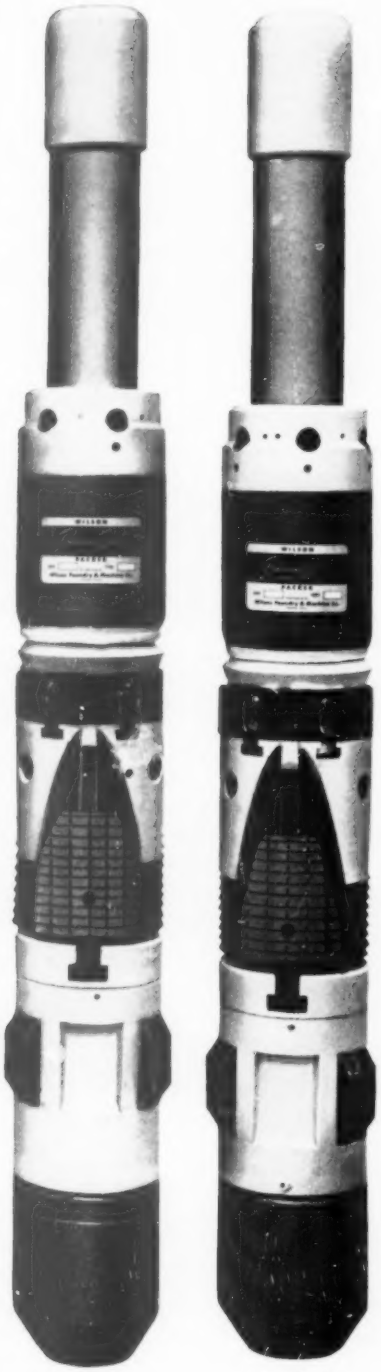
●

MB-1 Oscillator Tests Equipment In the Field

MB-1 Oscillator, with a S.I.E. geophysical microvolter, is the answer to the problem of testing geophysical equipment in the field. Completely portable and battery powered, it provides signal frequencies from 2 to 20,000 cycles per second a.c. or d.c. pulses at calibrated amplitudes of 1 microvolt to 1 volt.

The attenuator can match load impedances from 10 to 500 ohms. The oscillator may be used separately with an output signal strength up to 5 volts. The front panel is black anodized aluminum and the entire assembly is housed in a sturdy splashproof case equipped with a water-tight cover. *Southwestern Industrial Electronics Co.*

Check No. 9 On The Time Saver Card



Automatic Bottom

Standard

IT ISN'T LUCK

IT'S THE PACKER

that gets the JOB DONE!

THE WILSON Type "MB" METAL BLOCK PACKER

CANNOT COLD FLOW

The majority of all Packer failures are caused by the element "failing to hold."

This cause of failure has been positively eliminated in the WILSON type "MB"—Metal Block Packer.

Overlapping steel segments that come directly in contact with the casing right below element totally confines the rubber between the casing, the top of the "Metal Block" and the Mandrel of the Packer.

These steel segments expand against the casing at the same time the slips are set.

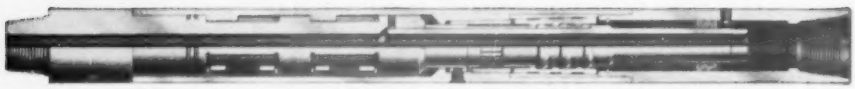
You can set the Wilson type "MB" — Metal Block Packer — AND KNOW IT WILL HOLD.

If your supply store does not have this outstanding Packer, write:

WILSON FOUNDRY & MACHINE CO.

1417 Elysian St.
HOUSTON, TEXAS

What's New... Use the handy Time-Saver Cards



Moving Parts of Safety Jar Work in Oil Bath

Sealed Type I Bowen Jar Safety Joints are filled with oil and sealed top and bottom. The sealed construction enables the tool to transmit circulating fluid at any pressure and prevents any contact between the well fluid and the working parts of the tool. With this arrangement, the moving parts work in a bath of oil.

The tripping tonnage does not increase or decrease regardless of the presence of sand or oil in the well fluid. As described below, the tripping tonnage can be varied only at the will of the operator. These jars can be used to perform several jobs before it is necessary to service them and the servicing procedure is simplified. The floater automatically moves up or down the washpipe maintaining a pressure balance within the tool and avoiding excessive pressure on the seals.

Joints are compact combination units designed to provide the services of both rotary jars and safety joints. They are installed as safety devices in strings during testing, coring, reaming, drilling, side-tracking, washing over operations, and during fishing operations. At the will of the operator they will either deliver heavy upward or downward blows against a stuck string or fish, or they can be disengaged to salvage all that is above them. *S. R. Bowen Co.*

Check No. 10 On The Time Saver Card

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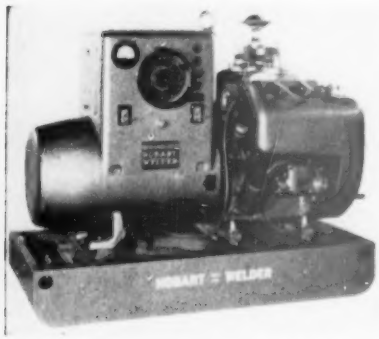


Combination Power-Welder Plant Offers Versatility

A selector panel in conjunction with a standard control panel makes this combination a.c. arc welder-a.c. power plant a most versatile power unit. By removing only two wing nuts, the selector panel can be moved to any one of three locations to provide 60 to 80 volts for welding, 100 volt power, or 220 volt power. After the selector panel is moved to the desired output marked on nameplate, the unit automatically provides the proper current characteristics for that purpose.

When used as a power unit, the generator will provide 110 volts, single phase, two-wire, 60 cycle a.c., or 220/110 volts, single phase, three-wire, 60 cycle a.c. Power factor is 80 per cent. It is also available with 50 cycle output at slight extra cost.

When used as an arc welder with the output selector panel in welding position, it makes available 60 to 80 volts a.c., with reactor in circuit to insure excellent welding characteristics. The generator is powered by a Wisconsin four-cylinder air-cooled engine with magneto ignition or hand-crank starting. It is equipped with a fly-ball type governor that maintains a constant speed of 1,800 r.p.m. *Hobart Brothers Co.*

Check No. 11 On The Time Saver Card

●

New Steel Coating Fills In, Replacing Moisture

Blakled (pronounced black lead) is said to be the answer to the corrosion problem of rusting steel.

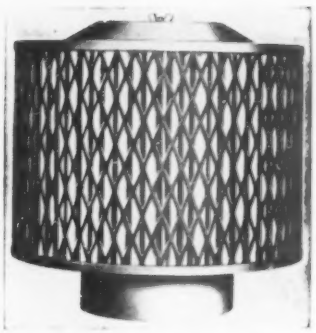
Blakled is neither a conventional paint skin nor a pigment ground into a vehicle. It fills in the surface of steel and actually replaces moisture and air on a steel surface, thus eliminating the principal cause of rust. Blakled may be successfully applied to wet, brushed rusted surfaces, and to dry or light mill scaled steel. It dries in an hour, and may be dipped, sprayed, or brushed. *U. S. Steel Supply Division, United States Steel Corp.*

Check No. 12 On The Time Saver Card

●

Air Filter Is for Small Engines and Compressors

Type FS intake air filter for small portable or stationary engines and compressors employs rayon-flocked screen wire as the filtering medium. The rayon flock is bonded to the 14-mesh galvanized screen wire with a thermoplastic bond that is impervious to gasoline or other solvents and permits a wide choice of cleaning methods.



The filter may be operated either dry or oil coated with very little difference in cleaning efficiency, but when oiled the dust holding capacity is comparable to that of a viscous-type filter. An inner perforated screen baffle serves to equalize the air flow.

The Type FS air filter is made in seven sizes, giving a capacity range from 50 to 800 cu. ft. per minute. A weather shield is available for outdoor installations. *American Air Filter Co.*

Check No. 13 On The Time Saver Card

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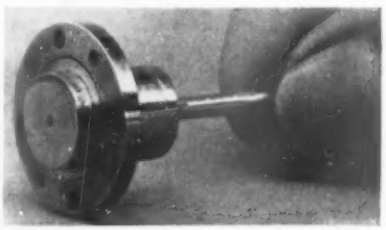

Pickup Provides for Rapid Pressure Transients

Where pressure transients occur too rapidly for observation with conventional indicating devices, the new electrical resistance-Type 4-312 Pressure Pickup provides immediate response to pressure changes. This miniature pickup is available in gage, absolute, and differential models which feature high corrosion resistance and a flush-type diaphragm. It may be used for either liquid or gaseous measurements.

Absolute models are available in 10, 15, 25, 50, 100, and 150 psia. ranges. Differential models are supplied with ranges ±5, ±7.5, ±12.5, ±25, ±50, and ±75 psid., and are usable with maximum line pressures of 150 psi. Upper limits of gage pickups are 5, 10, 15, 25, 50, 100, and 150 psig. *Consolidated Engineering Corp.*

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They're NEW

- Bulletins
- Catalogs
- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

Chemical Cleaning Service for Industrial Equipment. Brochure describes equipment, solvents, and inhibitors used for dissolution and disintegration of troublesome deposits which reduce efficiency of industrial equipment, such as boilers, condensers, superheaters, heat exchangers, towers, tanks, precipitators, cooling jackets, filter beds, and pipe lines. *Dowell Incorporated.*

Check No. 15 On The Time Saver Card

●

Heat Exchanger and Condenser Tubing. Known as TB 329A, the folder lists the analyses and mechanical properties of 29 carbon, alloy, and stainless tubing steels used in various types of heat exchangers and condensers. Additional data presented in other tables include reference specifications and applications information. *The Babcock & Wilcox Co.*

Check No. 16 On The Time Saver Card

●

Moisture Control in Compressed Air is title of new four-page brochure discussing types and quantities of impurities and methods for their removal. The Vi-Speed method, units, and desiccant are clearly described along with results that can be anticipated. The brochure gives the Vi-Speed method for providing clean, dry air satisfactory for use in practically all industrial and commercial applications. *Van Products Co.*

Check No. 17 On The Time Saver Card

●

Naylor Lightweight Pipe. As a practical help to pipe users, a new Bulletin No. 507 shows typical applications of lightweight lock-seam spiralweld pipe and fittings. Included are standard specifications on pipe from 4 to 30 in. in diameter, together with data on fabricated fittings, flanges, and connections to meet all pipe-line requirements. *Naylor Pipe Co.*

Check No. 18 On The Time Saver Card

●

Mobile-Mounted Hoists and Rigs. Bulletin 397 describes four Ideal mobile-mounted hoists and rigs for drilling and servicing. These rigs are the T-8, T-12, T-20, and T-32, which normally provide for drilling depths up to the range of 2,000 to 5,500 ft. They cover a servicing and workover range of 4,000 to 11,000 ft. Illustrations of typical mountings include dimensional drawings. *The National Supply Co.*

Check No. 19 On The Time Saver Card

●

Tank Protection System. A four-page, two-color illustrated bulletin describing the complete Tank Protecting System will be interesting to those responsible for exterior surface protection for tanks, storage vessels and tank cars. Designated as Technical Bulletin No. 5310, the publication describes primers, coatings, and trim recommended in the complete system, and complete data on surface preparation, priming, and application of finish and trim coats. *General Paint Corp.*

Check No. 20 On The Time Saver Card

●

Hale-O-Ring Butterfly Valves. Bulletin 70 features welded, threaded, and flanged end butterfly valves that give a positive seal when pressure is applied to either side of the disk. The direction of flow is not indicated, as on other types, as the valve will operate with the flow in either direction. End-to-end dimensions are shorter than on many similar valves. *Hale Manufacturing Co.*

Check No. 21 On The Time Saver Card

●

Industrial Oyltite-Stik, a two-color data sheet, features the application of Oyltite-Stik in stopping oil leaks instantly in storage tanks, oil filled transformers, piping, and oil containers, under moderate pressure. The product is especially useful for emergency repairs. *Lake Chemical Co.*

Check No. 22 On The Time Saver Card

●

B. S. & B. Welded Tanks. Fully illustrated with drawings and photographs, the 24-page catalog describes both shop and field welded stock tanks, flow tanks, and a complete line of accessories and venting equipment. *Black, Sivalls & Bryson, Inc.*

Check No. 23 On The Time Saver Card

●

Orifice Fittings. In the most complete catalog published to date, by this firm, will be found considerable engineering data relating to meter run design. Complete with graphs, charts, and curves showing recommended orifice fitting, installations, and piping arrangements, this new catalog carries many standard

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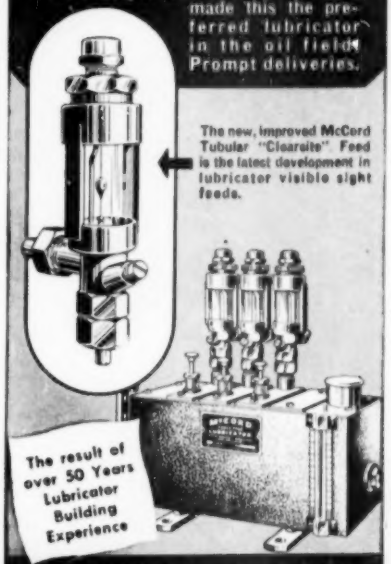

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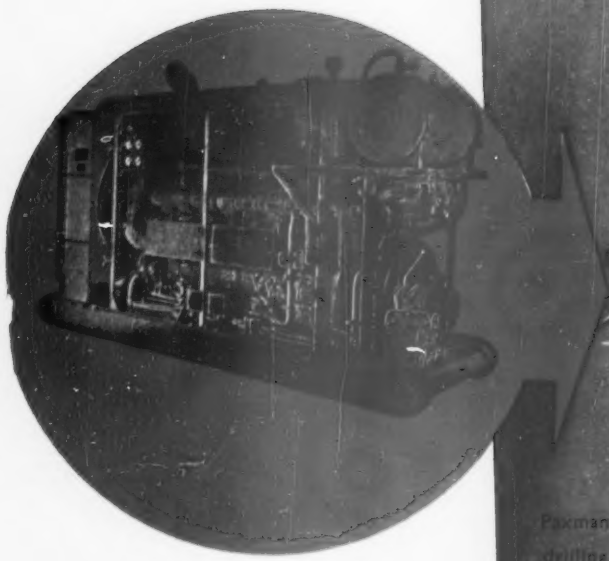

Paxman diesel engines for oil well drilling are mounted on sturdy skid type bases to facilitate handling on and off vehicles for transportation from site to site. They are of compact design and built to keep going under the most arduous conditions. Power and reliability are common throughout the Paxman range of engines which are rated from 100-665 b.h.p.

PAXMAN

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OIL WELL PACKAGE SETS

DAVEY, PAXMAN & CO. LTD., COLCHESTER, ENGLAND

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tables useful to those concerned with orifice fitting application. *Robinson Orifice Fitting Co.*

Check No. 24 On The Time Saver Card

●

The Power Behind the Pump. Pictures of Cat engines on oil-pumping jobs and testimonials by owners are portrayed throughout the eight-page booklet. Fuel systems, full-flow lubrication systems, and automatic controls are a few of the points featured. The power line; a chart giving the maximum, rated and continuous output of each model; and map of North America showing factories, parts depots, and dealer outlets completes the booklet. *Caterpillar Tractor Co.*

Check No. 25 On The Time Saver Card

●

Allegheny Metal in Chemical Processing is a completely revised 34-page book covering the use of stainless steel in the manufacture of acids and other chemicals, in the general process industries. Also included are corrosion resistance data, fabricating information, and a stainless steel finder. *Allegheny Ludlum Steel Corp.*

Check No. 26 On The Time Saver Card

●

Refinery Inspection Gages. A spiral thickness gage and a line of "U" caliper gages, all designed for obtaining wall-thickness measurements of process vessels and piping are described in this data sheet. The spiral gage is for taking measurements through small test holes, and the caliper gages are used at nozzle or man holes. *John J. Becker & Co.*

Check No. 27 On The Time Saver Card

●

Corrosion-Resistant Water-Flood Meter, for accurately measuring water injected underground in secondary-recovery operations, is illustrated and described in a new two-color Bulletin No. 559. Made of special alloys to withstand corrosion, the meter handles pressures to 2,000 psi., and is accurate at rates of flow between 3 and 28 bbl. per hour. *Neptune Meter Co.*

Check No. 28 On The Time Saver Card

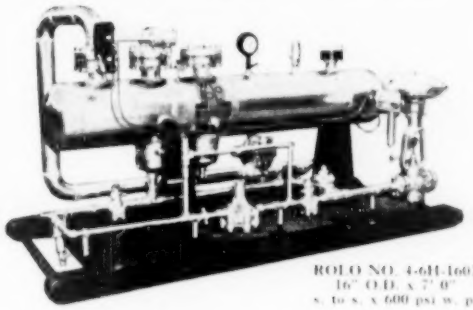
●

Page Production Tools. A new, completely illustrated catalog covers the operation of all Page production equipment. Such items as the Page tubing anchor are dealt with at considerable length. The catalog is of value to oilfield production men. *Page Oil Tools, Inc.*

Check No. 29 On The Time Saver Card

ROLO WELLCHECKERS

Permanent and Portable Separators For Metering Oil and Gas



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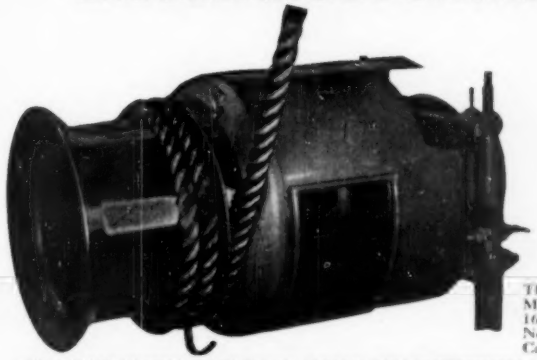

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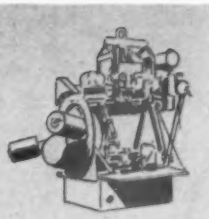

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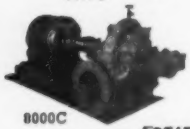
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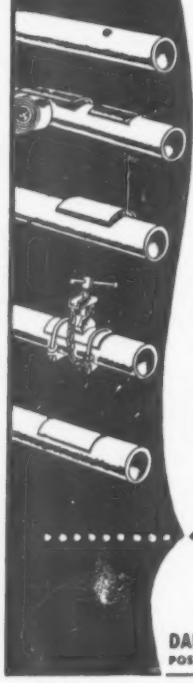

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2 Cut a piece of plate, ready-made half sole or sleeve to extend about 1" on both sides and ends of gasket.

3 Fit plate over gasket so it extends beyond the GRO-CORD gasket on all sides.

4 Clamp repair tight with a chain jack to shut off the leak. With clamps, hold plate in contact with pipe at all points. Weld all around and REMOVE CLAMPS. Clamps may be left until welding equipment is available. GRO-CORD gaskets have been in service as long as 5 years before final weld.

5 Permanent welded repair after clamps removed. Specially shaped GRO-CORD gaskets are used by pipe line companies everywhere. Tested at 1600 lbs. p.s.i., oil resistant cotton impregnated GRO-CORD gaskets last for years.

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PIPELINE

Line Approved

Pawnee to begin work on new Colorado crude line

DENVER.—Construction of a 10-in. crude line connecting Adena field, Morgan County, Colorado, with existing lines at Merino has been approved by the Colorado Public Utilities Commission.

Pawnee Pipe Line Co., owned jointly by Pure Oil Co. and Sinclair Oil & Gas Co., will construct the 35-mile, 45,000-bbl. per day line to handle production in Adena field.

An application for a similar line by Inland Pipe Line Co. of Denver was withdrawn.

Final clearance was given by the commission when it denied a request by Omaha-Denver Express Co. for a rehearing based on the express company's contention that the line should be under federal jurisdiction, rather than that of the commission.

The express company contended oil moved through the line will go directly into interstate commerce via Toronto Pipe Line Co.'s system from Merino, Colo., to Gurley, Neb., and Platte Pipe Line Co.'s system from Gurley east.

A similar request by Omaha-Denver Express Co. was denied following approval of Goodall Pipe Line Co.'s request for a line from Little Beaver field to Merino. This line is now in operation, but action in Colorado's lower courts is pending on the express company's challenge of the state commission's jurisdiction.

Construction of the Pawnee line is scheduled to start immediately and is expected to be completed within 36 days.

Work Started

Stonewall Gas building gas-gathering system

DALLAS. — Stonewall Gas Products Co., Inc., started construction last week on more than 100 miles of 2 to 10-in. pipeline to gather gas from eight fields in Stonewall County, Texas.

The new lines, scheduled for completion in about 75 days, will make available from 12,000 to 15,000 M.c.f. of gas daily for processing at the company's natural-gasoline plant in Katz field in the northeastern corner of the county *(The Oil and Gas Journal, February 22, page 240)*.

The plant was obtained by Stonewall Gas Products from Stonewall Corp. recently on long-term lease. It currently processes only a small amount of gas from Katz field.

The new gathering system will tap Old Glory, Boyd, Flowers, Upshaw, West Flowers, Guest, Aspermont Lake,

Line Crosses Canal Without External Support

Crude oil pipeline arches over a major drainage canal on a 22-in. portion of Interstate Oil Pipe Line Co.'s new line from Bunkie, La., to Moore station near Shreveport. The relatively unusual arched crossing of the canal employs no suspension to support the pipeline. The crossing and new line are part of a 3-year $21,700,000 expansion program recently completed by Interstate which included 410 miles of new main line and three new pump stations. For details on the expansion program, see Industry Affairs.

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Swepco pipe, tubing and welding fittings, 3" to 48" O.D., are obtainable in stainless steel, nickel alloys, titanium, Carpenter "20", Hastelloy alloy, other alloys. Lengths up to 20 feet, extra heavy schedules and with high cylinder finishes.

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and Frankirk fields. Field booster stations will be constructed in each field to boost the gas to the Katz field plant. This will make unnecessary the boosting of the plant's present compressor capacity of about 5,000 M.c.f. Process capacity is about 12,000 M.c.f. at present.

Contract for construction of the gathering lines is held by Vaughn & Taylor Construction Co., Odessa, Tex.

Union Oil Planning New 60-Mile Crude Pipeline

LOS ANGELES.—Union Oil Co. of California is planning the construction of a 60-mile crude line from its Santa Clara Valley fields to its Wilmington refinery.

Contracts for its construction have not been let but the line is expected to be completed by late this year. Planned initial capacity is 50,000 bbl. daily.

Currently the company's own and purchased crudes from fields in the Santa Paula area are being moved by pipeline to a marine terminal near Ventura. From there they are shipped by tankers to its Oleum or Los Angeles refineries. Union's current movement of approximately 50,000 bbl. daily from these fields is practically double that of 3 years ago.

Transco Gas Schedules $11,000,000 Construction

HOUSTON.—Transcontinental Gas Pipe Line Corp.'s 1954 construction program will cost in the neighborhood of $11,000,000, Tom P. Walker, president, said here last week.

The firm has filed applications with the Federal Power Commission for storing 12 billion cubic feet of natural gas in Oakford storage field of Pennsylvania for withdrawal in the winter, beginning in November.

Transco also applied for permission to construct and operate facilities providing for a total increase in its delivery capacity of 103,490,000 cu. ft. of gas daily, 10,000,000 cu. ft. of which would start in November 1954, and the balance November 1955. Cost of constructing these facilities is estimated at $59,600,000.

$110,000,000 Expansion Planned by Columbia Gas

NEW YORK.—Columbia Gas System, Inc., has planned construction this year which will cost an estimated $110,000,000, compared with the $54,-

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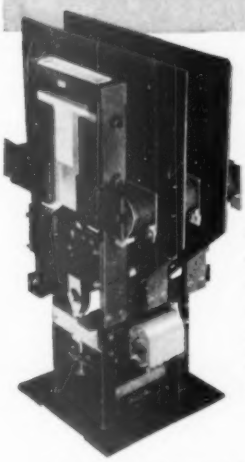
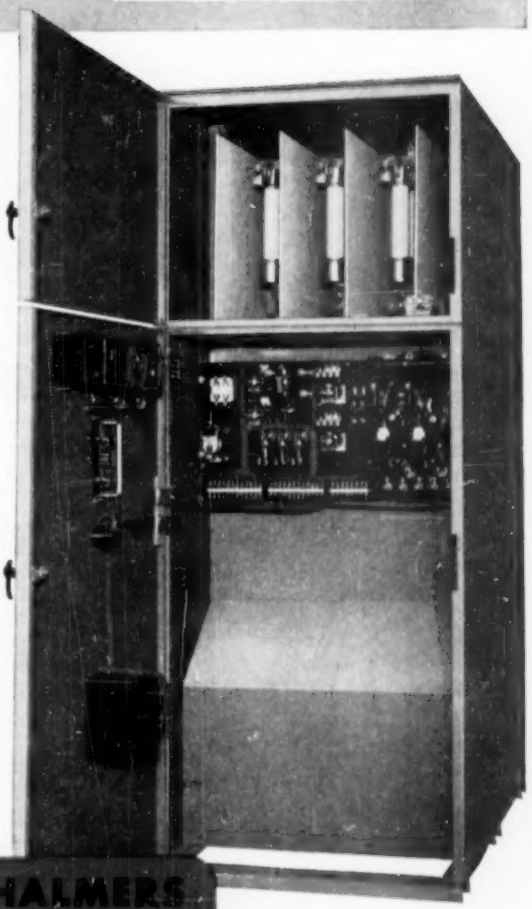
AIR or OIL?

Either may be built into your Allis-Chalmers Type H starter along with meters, overload relays, current limiting fuses, auxiliary switches . . . the coordinated components dictated by your application for complete protection of man, motor and machine.



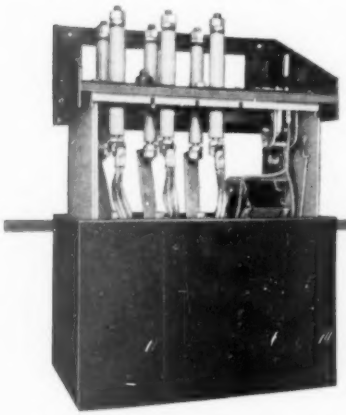
AIR-BREAK CONTACTOR

When the going's rough . . . that's the place for the Type 256 air-break contactor. Frequent starting, inching, reversing or dynamic braking are taken in stride by this rugged performer. And, of course, fire hazard is greatly reduced. No turning shafts, shaft bearings and flexible leads to cause maintenance headaches. Double-break contacts, vertical action and dual blowouts provide long, trouble-free operation.



OIL-IMMERSED CONTACTOR

Got atmospheric troubles? The Type MO oil-immersed contactor will perform heavy duty starting service in dust-laden, corrosive and very moist atmospheres. Contactor is of the time-proved clapper type. Self-cleaning, rolling-wiping action extends contact life. Make and break arcing occurs only on tips. Self-aligning E type magnet provides perfect armature seating . . . long, quiet operation. Permanent windlass tank-lifter simplifies maintenance. A-4103



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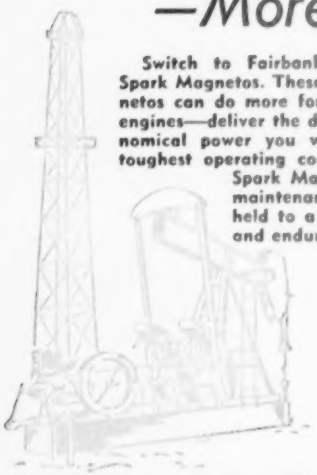

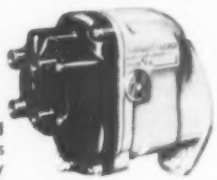

Switch to Fairbanks-Morse Super Spark Magnetos. These efficient Magnetos can do more for your pumping engines—deliver the dependable, economical power you want under the toughest operating conditions. Super Spark Magnetos rarely need maintenance—down-time is held to a minimum. Quality and endurance are built into Super Spark Magnetos—oversize high tension coils—large long lasting breaker points—ball bearing supported one piece magnetic rotor and powerful Alnico magnets.

Standardize on Super Spark Magnetos. See your Fairbanks-Morse Service Station or distributor or write Fairbanks, Morse & Co., Magneto Division, Beloit, Wisconsin.

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This compact, completely self-contained unit is for gas line service. This vessel, which is 24" in diameter and 66" in length overall, will handle 15 MMSCFD at 1000 lbs. wp. It needs no protective covering. This unit can separate free water, discharging distillate and gas together, or it can be used as an all liquid knockout. End connections permit easy cleaning of the unit to remove mud, sand, etc. Use this *Oil Metering* Free Water Knockout anywhere in gas flow lines where liquid water must be removed.

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800,000 spent for construction during 1953.

Construction proposed for 1954, according to Columbia Gas' annual report, includes 116 miles of 26-in. looping of the "Toughest Inch" line, 220 miles of large diameter line at various spots in the system as extensions, replacements or loops, producing field lines, about 600 miles of new and replacement distribution mains, six new compressor stations, installation of 7,900 hp. in existing compressor stations, development of three new underground storage fields and continued expansion of others, and drilling of 215 new gas wells.

Northern Natural Will Absorb Pipeline Affiliate

WASHINGTON.—Northern Natural Gas Co. has been authorized by the Federal Power Commission to acquire all the natural-gas facilities of its wholly owned subsidiary, Independent Natural Gas Co. *(The Oil and Gas Journal, January 25, page 415.)*

Independent's facilities include an 11,200-hp. compressor station and about 21 miles of 20-in. pipeline located in Gray and Carson counties, Texas, through which it transports about 36,000 M.c.f. of gas daily purchased from Phillips Petroleum Co. for sale to Northern, and about 10,000 M.c.f. daily which Northern purchases from Phillips.

Pipeline Conference Date Set by A.S.C.E. Division

MIDLAND, Tex.—The construction division of the American Society of Civil Engineers will hold its first pipeline conference here at the Hotel Scharbauer, April 9-10.

Included on the program are papers on pipeline surveys, aerial photography, piping codes, and operation of a gravity gathering system. Discussions will follow the presentation of all papers.

Welding Meeting Slated

BUFFALO, N. Y.—Welding of piping and tubing are including in the major topics to be covered in 39 papers scheduled for delivery at the national spring meeting of the American Welding Society to be held here May 4-7.

In conjunction with the meeting, the second Welding Show will be held displaying welding equipment and accessories. Tours of plants in the Buffalo and Niagara Falls area will be conducted to show practical, working methods of welding.

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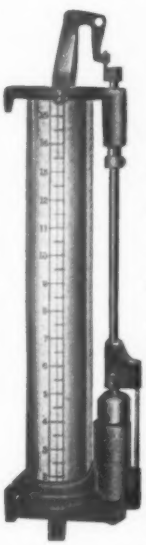

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LIGHTWEIGHT — through better design and the use of finer tougher steels.

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LOW EFFECTIVE GROUND BEARING PRESSURE — — MAXIMUM MANEUVERABILITY — through perfect balance on long full crawlers.

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WHEEL AND CRAWLER SPEED COMBINATIONS FOR EVERY SOIL CONDITION — 12 Crawler Speeds forward, 12 reverse, for *each* of 4 forward and 1 reverse speeds of motor transmission. This pair of transmissions provides finger-tip choice of wide ranged, closely spaced, non-slipping speed combinations.

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1ST WITH PRESSURE SEAL BONNET

The W-K-M Pressure Seal Bonnet eliminates bonnet flanges and studs. It is self-adjusting to temperature changes and instead of needing to loosen under pressure as conventional bonnets do, it seals tighter as the pressure increases.

1ST WITH FULLY AUTOMATIC LUBRICATION

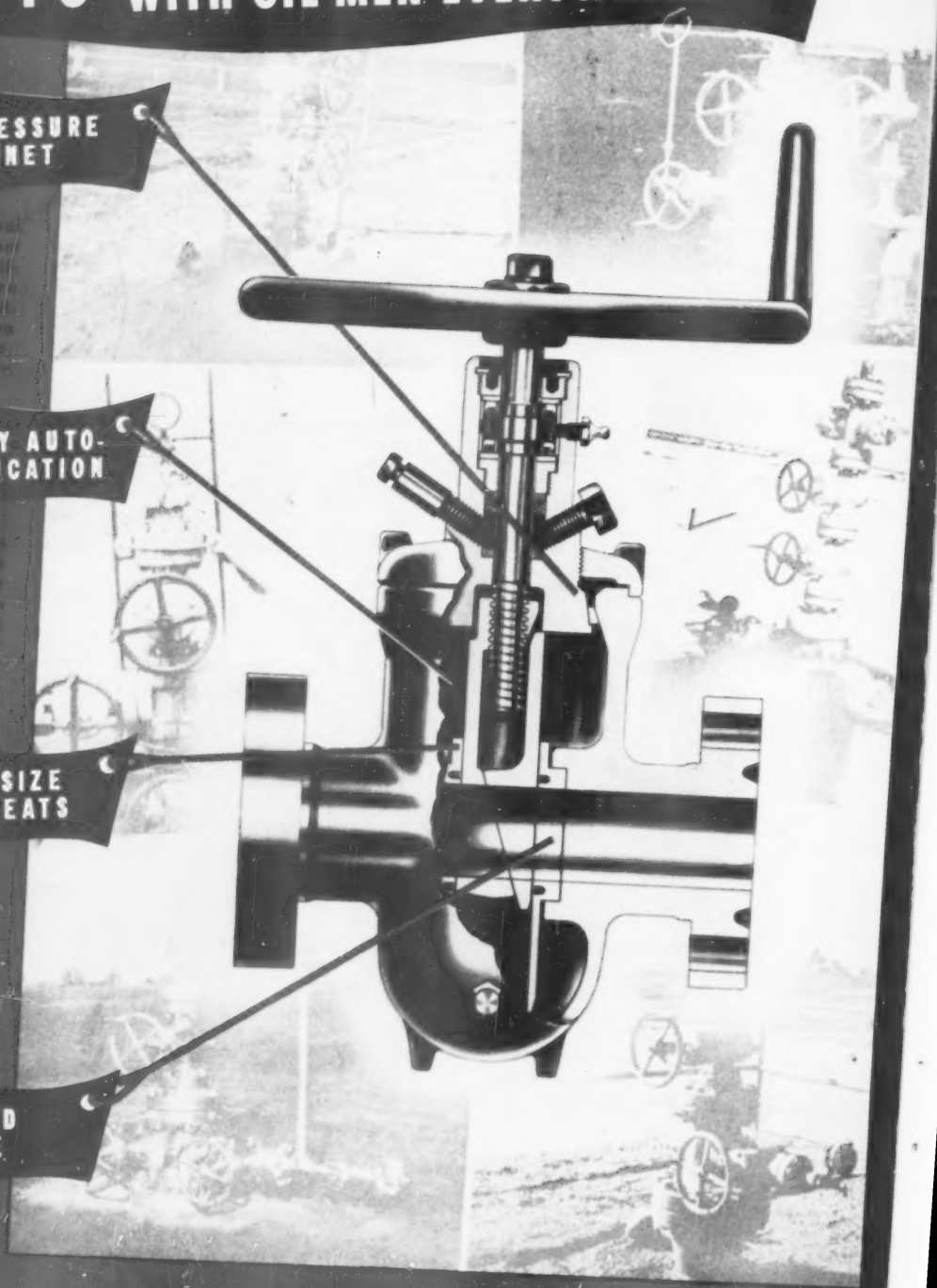
The body of W-K-M Valves may be used as a grease reservoir thus automatically lubricating internal parts with each operation. In most cases this amount of grease represents a lifetime supply. The valve does not depend upon grease for a seal and may be used without lubricant.

1ST WITH OVERSIZE RENEWABLE SEATS

W-K-M Valve Seats are made with an exceptionally large seating area so that they will stand up far longer between overhauls. The seats may be removed and replaced while the valve is on the line. They are protected from the flow in either open or closed position.

1ST WITH ROUND SMOOTH BORE

The gate and segment construction of W-K-M Valves provides a perfectly smooth bore through the valve the same I.D. as that of the pipe. Fluid flow through the valve is perfectly smooth. Destructive turbulence, which at high pressures can cut an ordinary valve to pieces, is completely absent in W-K-M Valves. Specify W-K-M VALVES.



W-K-M Valves

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REFINING

Symposium on Gasoline Additives Set by N.P.A.

CLEVELAND.—A three-paper symposium on gasoline additives entitled "The Problem of Combustion Chamber Deposits" will be one of the highlights of the fifty-first semiannual meeting of the National Petroleum Association here April 14-16.

Other sessions at the meeting will concern industrial relations, traffic and transportation, government economic policies, business conditions, and a meeting of the central committee on railroad transportation of the American Petroleum Institute.

Papers to be presented in the gasoline additive symposium and their authors are:

"Improved Gasoline Performance with Phosphorous Additives," E. Dunning, R. E. Jeffrey, and L. W. Griffith, all of Shell Oil Co.; "The Control of Combustion Chamber Deposits," C. F. Fleming, Jr., Standard Oil Development Co.; and "The Preignition Problems," Harold Gibson and H. E. Hesselberg, Ethyl Corp.

Prepared comments on the papers will be presented by Dr. W. E. Kuhn, of The Texas Co., Dr. J. C. Geniesse of Atlantic Refining Co., and J. G. Moxey, Jr., of Sun Oil Co.

Cat Reformer Completion Slated in May By Ohio Oil

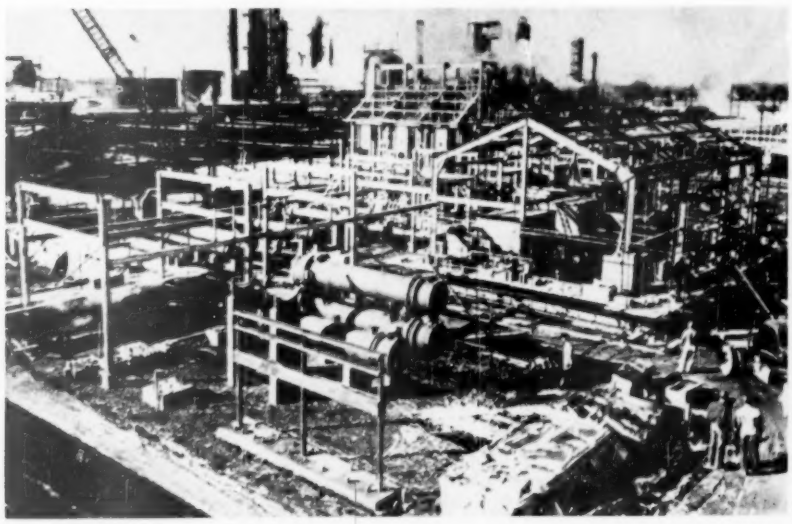
FINDLAY, Ohio.—Ohio Oil Co. expects to complete an 8,000-bbl. per day catalytic reformer at its Robinson, Ill., refinery in May, according to the company's annual report to stockholders.

Also at the Robinson refinery, a 1,500-bbl. alkylation unit is under construction.

Shell's Antismog Program Runs Ahead of Schedule

LOS ANGELES. — Shell Oil Co. plans to spend more than $1,000,000 this year on its air pollution control program, which is running well ahead of schedule on an over-all basis, according to company officials.

The program this year will bring the total expenditure for this work to well over $3,500,000, directed toward con-



New Cat Reformer to Be Completed Soon

A new catalytic reformer at Pure Oil Co.'s Heath refinery at Newark, Ohio, is shaping up for expected completion by June. The 3,000-bbl. per day unit employs a regenerative platinum catalyst developed by Sinclair Research Laboratories, Inc., in cooperation with Baker & Co., Inc., to upgrade low-octane naphthas into high-octane gasolines. Provision has also been made for operation with high-sulfur feed stocks. M. W. Kellogg Co. is the contractor for design and construction of the unit, which will be the first commercial installation of this type to go on stream. Two others are under construction or planned, with the latest being one announced for Sinclair Refining Co.'s East Chicago refinery.

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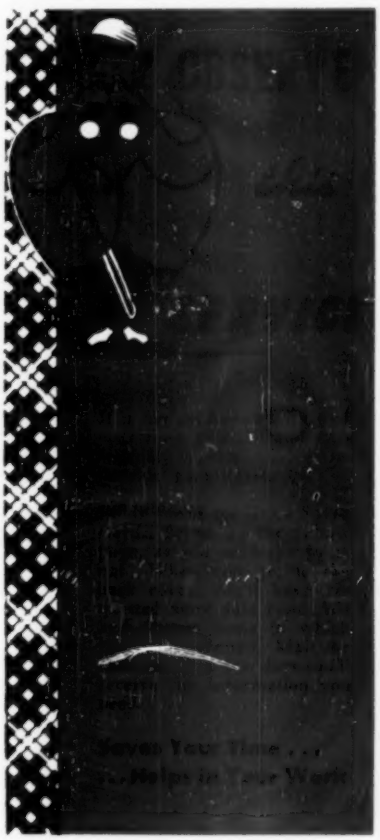

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trol of hydrocarbon emissions, elimination of odors, and control of dust, smoke, and sulfur dioxide.

Expenditures for compliance with Rule 56 of the Los Angeles County Air Pollution Control District alone total $1,168,300 to date, and additional expenditures of $916,000 are expected along that line this year. Vapor emission control work on Shell's storage tanks in the Los Angeles Basin will be completed months in advance of the May 1, 1955, deadline imposed by Rule 56.

Refining Briefs

WILMINGTON, Del.—Du Pont Co. has announced a reduction of 1.2 cents per pound in the price of tetraethyl lead, which has been made possible by operational improvements. The new prices of Du Pont's tetraethyl lead are 38.30 cents per pound for motor mix compound and 41.88 cents per pound for aviation mix compound.

NEW YORK.—J. P. O'Donnell Corp. of New York and Beaumont, Tex., has been licensed by Atlantic Refining Co. for the mechanical design and construction of Atlantic catalytic reforming units.

Petrochemicals

Phillips Plans New Plant For Polyethylene Plastic

BARTLESVILLE, Okla. — Phillips Petroleum Co. has announced plans to build a semicommercial plant at Adams Terminal on the Houston, Tex., ship channel to produce polyethylene plastic by a new process.

Phillips officials say the new process "operates at relatively low pressures of less than 500 psi. as contrasted with the extreme pressures of 15,000 to 30,000 psi. employed in present commercial polyethylene production."

The company is currently expanding its petrochemical manufacturing facilities at Adams Terminal. Phillips anticipates building a large plant to produce polyethylene with the new process after a sampling of the plastic goods manufacturers with production from the proposed new unit.

Phillips officials said polyethylene plastic produced by the new process "greatly improves" film, tubing, and coated paper products, and opens a new field of uses—polyethylene plastic vessels which may be steam sterilized.

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Without obligation let us show you how to save ⅓ on your plug valve maintenance. Your valves will last longer, operate easier—and lubricate 10 to 15 times faster.

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The Delta High Pressure Gun and one-piece double-check fittings enable one operator to lubricate 10 to 15 valves in the time required to service 1 with jack screw. Delta fittings are available for ANY lubricated plug valve.

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No need to stock dozens of lubricants when only 4 Desco Lubricants do the entire job. Stays in your valves, keeps them easy to operate. Will not harden or coke-up, because no fillers or inert materials are used. Convenient gun size or jack screw sticks or in bulk.

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DELTA AUTOMATIC PLUG VALVE LUBRICATOR

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Fittings—Guns—Lubricants
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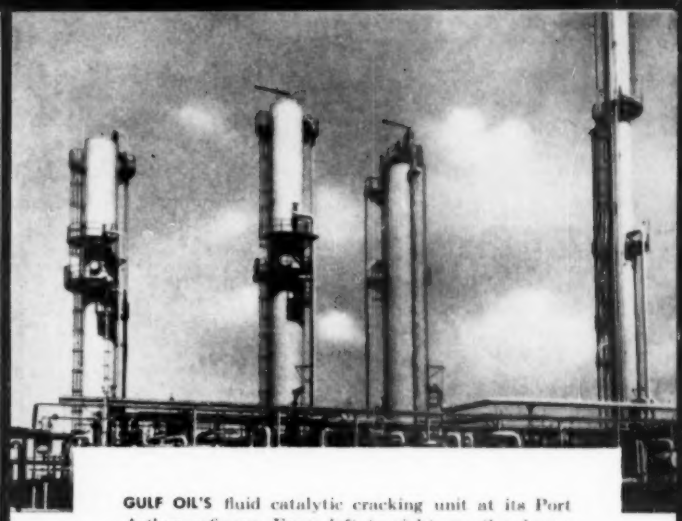
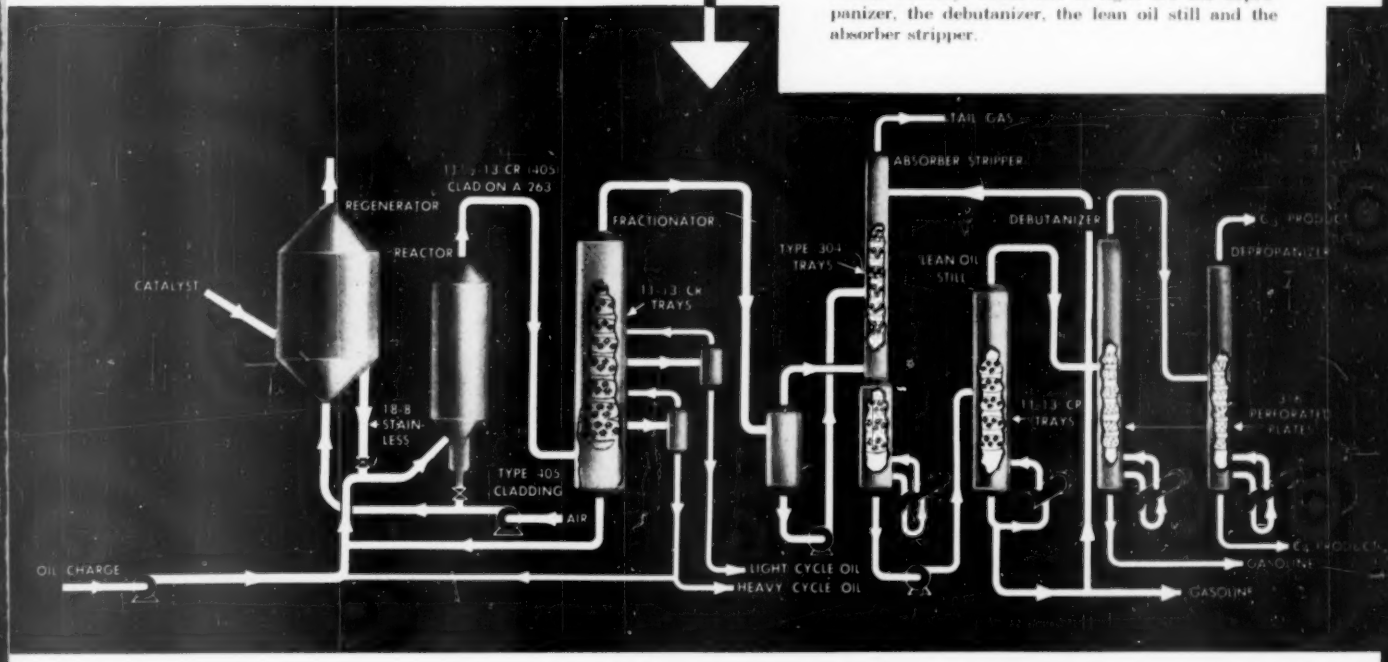
HOW GULF USES STAINLESS STEEL in a fluid catalytic cracking unit



GULF OIL'S fluid catalytic cracking unit at its Port Arthur refinery. From left to right are the depropanizer, the debutanizer, the lean oil still and the absorber stripper.



THE fluid catalytic cracking unit diagrammed here was built in 1951 for the Gulf Oil Corporation's Port Arthur, Tex., refinery. With the help of Stainless Steel—used extensively in trays and piping—this unit handles 65,000 barrels of prepared charging stock daily.

The flow chart shows the various grades of Stainless used in different parts of the unit. Trays in the absorber stripper are Type 304 Stainless Steel, while tray plates in the debutanizer and in the depropanizer are Type 316.

Such careful selection of grades is extremely important in obtaining the maximum corrosion resistance and long life from Stainless Steel. Properly applied, Stainless Steel is one of the most important tools you can use in keeping your refinery operations on stream at all times.

Our new book, "Performance of Stainless Steels in Petroleum Refinery Service," contains much valuable data on properties of various grades. If you do not have a copy, mail the coupon below. And our representatives are always available to assist you in the selection of the right grade of perfected, service-tested USS Stainless Steel.

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— plus, of course *all* the other features of H. C. Smith bit construction, such as *All-Forged Parts, Triple Cutter Bearings* and *Precision-Cut Tool Joint Thread.* These are the rock-bottom reasons for the reports from one oil field after the other, telling of faster footage and longer digging life with H. C. Smith 3-Cutter Bits.

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Drilling Activity Holds At High Level for Year

Over-all drilling activity in the United States and western Canada continued last week at the new high level for the year which was set the previous week. Minor variations in the number of operating rigs in the various districts balanced out in the total, 2,754 rigs as compared with 2,753 the week before.

Increases were reported in the Gulf Coast, Arkansas-North Louisiana-Arkansas, Kansas, and Illinois area. These were offset by decreases in other areas.

ACTIVE ROTARY RIGS*

Area—	Week ended 3-22-54	Change week ended 3-15-54	Change week ended 3-23-53
Gulf Coast	532	+29	+67
N. & W. Tex.-N. M.	806	+6	+31
Ark.-N. La.-E. Tex.	198	+5	+79
Oklahoma	395	+13	+59
Kansas-S. Nebraska	163	+2	+17
Illinois-Eastern	133	+2	+35
Rocky Mountains	230	−5	+48
Pacific Coast	148	−7	−11
Total U. S.	2,605	+7	+95
Western Canada	149	−6	−23
Total	2,754	+1	+72

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, and the Pacific Coast and Illinois-Eastern areas are shown on pages 181 and 182.

H. L. Rowley, Inc., Shreveport, is keeping a rig busy in Overton field, Adams County, Mississippi, where it is under contract to William Helis and Southern Producing Co. Latest operation is 7-C Overton Hills, another Wilcox well with projected depth of 6,555 ft.

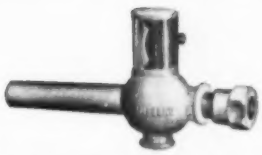
Jett Drilling Co., Shreveport, is drilling for Magnolia Petroleum Co. in LaGrange field, Adams County, Mississippi, where Wilcox production is being developed over a wide area. Rig now is on 10 Reale heirs, in 5-6n-2w.

Frio Drilling Co. is drilling on a 6,000-ft. contract it has with Carrl Oil Co. and Shore Exploration Co. at 1 Villareal, a wildcat 2 miles west of Sejita, in Duval County, Southwest Texas. Location is in Lot 4, Section 54, Copita Farm & Garden Tracts.

Carter-Jones Drilling Co., Kilgore, Tex., is drilling for **Delta Drilling Co.,** Tyler, Tex., at 1 Dowell, a projected 4,000-ft. Woodbine exploratory test, located 2 miles west of Point, in Rains County, northeastern Texas. Location is in the A. R. Taylor Survey.

Krug Exploration & Drilling Co., Bakersfield, Calif., is starting a wildcat test for Oceanic Oil Co. in the Hermingshaus area, in Fresno County, California.

E. B. White (right) and Harrold Ellis (second from right), owners of White & Ellis Drilling Co., El Dorado, Kans., visit one of their rotary rigs operating near Eureka, in Greenwood County, southwestern Kansas, for Stewart Oil Co., of Wichita, Kans. With them are, left to right: A. L. Cody, their tool pusher; Russell and Norman Stewart, owners of the operating company; Carol Harlan, driller; Roy Watkins, Don Miller, and Bartley Hogaboom, roughnecks; and Elza McBride (rear), Continental Supply Co. (Photo by courtesy Continental Supply Co.).



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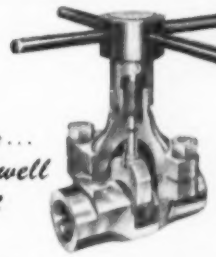

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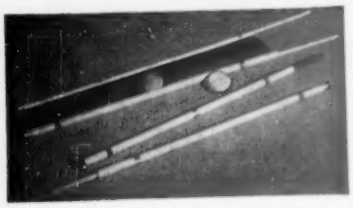
MAP STICKS



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Shot-filled horsehide bags—just toss 'em on! They hug your map to the board like an extra pair of hands! Say goodbye to maps with thumb tack perforations and gummy edges left by masking tape. These weights will hold your maps better! Send for Bulletin 352-A.

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It seals against high pressures and temperatures — is impervious to salt water and dilute acids — insoluble in petroleum products — provides proper lubrication for high speed make-up. It never becomes hard or brittle — will not "freeze" the joint.

Rectorseal #1 is economical — easy to use. Available in quart and gallon cans. Ask for it by name at your Supply Store.

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RECTOR WELL EQUIPMENT CO., INC
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Location, listed as 31-30 Ponte, in 30-13-17, is 3 miles southeast of Gill Ranch gas field.

Nicklos Drilling Co., Houston, is starting another well for Amerada Petroleum Corp. at Bayou Fordoche, in Pointe Coupee Parish, southeastern Louisiana. It is at 3 Sundean, in 30-5s-9e. Contract depth is 10,600 ft.

Riddle Drilling Co. is working on a 2,500-ft. test it has contracted to drill for Bass & Abercrombie at a wildcat location a mile east of Utley, in Bastrop County, South Texas. Location is in the Josiah Wilbarger League.

Brown Drilling Co., Long Beach, Calif., has a new contract with Humble Oil & Refining Co. for an 8,000-ft. test, 1 Sutter Basin Corp., in the Robins area, near Yuba City, in Sutter County, northern California.

Brach Drilling Co., Wichita, Kans., has a contract with Socony-Vacuum Oil Co., Inc., for an 8,400-ft. Dakota test to be drilled northeast of Cole Creek, in Natrona County, Wyoming. Location is for F-41-9-G, in 9-35n-77w.

Wakefield Drilling Co., Wichita, Kans., is starting another test for Vickers Exploration Co. in the Clareton-Cheyenne River area, in Niobrara County, Wyoming. The new operation, 2 Government, is at an extension location in 31-41n-66w.

Crescent Drilling Co., Inc., Monroe, La., has taken on two additional deep-drilling contracts in North Louisiana. One is with Carter Oil Co. for a 9,700-ft. Cotton Valley test, 1 Rhymes, 4 miles southeast of Monroe, in Ouachita Parish. The other is with Lion Oil Co. for a 10,500-ft. south offset (1 Greer) to Republic Natural Gas Co.'s newly completed Smackover discovery well in the Colquitt area, Claiborne Parish.

Sunnyland Contracting Co., Rayne, La., has a new contract job under way southeast of South White Apple field, in Franklin County, southern Mississippi. The test, 1 U.S.A., projected to 7,000 ft., is for David K. Brooks and associates, of Houston.

Survey Drilling Co., Dallas, has moved a rig to a wildcat location 5½ miles southeast of Brewton, Escambia County, southern Alabama, for another Lower Cretaceous test which Gulf Refining Co. has projected for its extensive lease holdings in that general area. The new operation is 2 Atkinson, in 17-1n-11e. Objective is expected around 5,900 ft.

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*Reg. U.S. Pat. Off.

How the oil fields taught industry a lesson

It's hard to think of a tougher proving ground for machinery than the oil fields. Heavy shock loads and corrosion really give machine parts a workout. Take sheaves, for example. They used to be a big problem to oil men.

If the sheave was tight enough on the shaft to absorb all the shock loads, it was usually hard to get off when clutch or pump repairs were necessary. And if the sheaves came off easily, chances are they weren't on tight enough to withstand the loads.

To solve this problem, Worthington designed and developed the first sheave with a tapered, split hub. It was easy to get on, easy to get off, yet gripped the shaft tightly. Today, 15 years later, Worthington's QD (Quick Detachable) is the most widely used sheave in the world — the accepted standard in industry as well as the oil fields.

Local Worthington QD distributors in all oil-field areas are stocked-up in most sizes and they're backed up by factory stocks in Los Angeles, Fort Worth, Houston, Tulsa and New Orleans.

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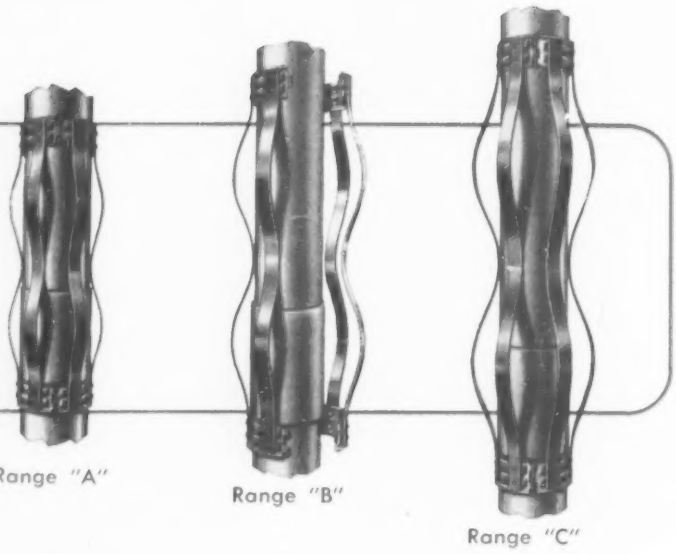
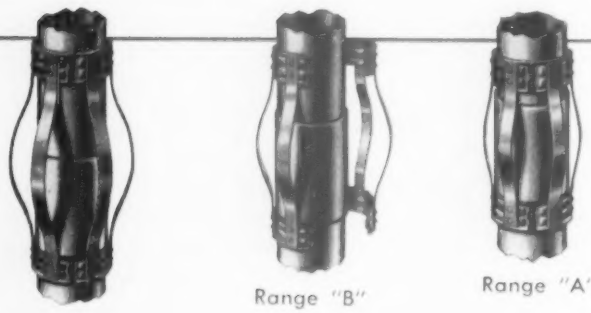
LONG LOK-ON CENTRALIZERS (FIG. 905)

The double-bow design of these advanced Casing Centralizers provides more than sufficient strength to center any string of casing under any condition which casing might be run.



Range "A" Range "B" Range "C"



Range "C" Range "B" Range "A"

SHORT LOK-ON CENTRALIZERS (FIG. 904)

Economical, easy-to-install, easy-to-run Casing Centralizers which are second only to the Larkin Long Lok-on in centering strength and efficiency. They are fully satisfactory for use under any but the most extreme conditions.

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NATURAL GAS

Expansion Planned

Equitable Gas announces $8,000,000 '54 program

PITTSBURGH, Pa. — Equitable Gas Co. here has announced an $8,000,000 expansion program, including completion of Logansport storage pool in Marion and Wetzel counties, West Virginia, which is estimated to have storage capacity of 3,000,000 M.c.f. of natural gas.

The planned 1954 expenditure will boost to $58,440,000 the amount spent by Equitable since the end of World War II in expansion, resulting in over 26,000,000 M.c.f. of gas in storage at the beginning of the 1953-54 heating season in Pennsylvania and West Virginia. Further expansion of the existing storage facilities is also included in this year's program.

Allocation of funds for expansion this year includes about $2,600,000 to maintain gas production at current levels, $2,100,000 for replacements of lines and other facilities to maintain operating efficiency, $1,400,000 for further development of underground storage, and $1,800,000 for extensions and improvements of the distribution system.

Equitable has entered into long-term contracts with Humble Oil & Refining Co., Sunray Oil Corp., and Flour Bluff Oil Corp., providing for the daily purchase of about 10,000 M.c.f. of gas beginning in the winter of 1954, another 10,000 M.c.f. in 1955, and 5,000 M.c.f. more in 1956. Tennessee Gas Transmission Co. will transport the gas from Texas to Pittsburgh, Pa.

The new long-term contracts are in addition to those already in effect with Equitable's principal suppliers, Texas Eastern Transmission Corp. and Tennessee Gas.

Cities Service Plans Gas Line Construction

WASHINGTON.—Cities Service Gas Co. plans to construct 33 miles of natural-gas transmission lines in Kansas and Missouri to replace existing facilities.

Cities Service has applied for Federal Power Commission authority to construct 24 miles of 26-in. line in Franklin and Johnson counties, Kansas, to replace two existing 16-in. lines, and to build 9 miles of 20-in. line in Cherokee and Jasper counties, Missouri, to replace an existing 16-in. line.

The $1,860,500 project would provide additional capacity of 46,531 M.c.f. of gas per day through the 26-in. line on the system between Ottawa, Kans., compressor station and the Kansas City area, and provide additional output of 2,225 M.c.f. of gas daily through the 10-in. line from the company's Saginaw, Mo., compressor station into its Springfield, Mo., lateral.

Southern Natural Gets Gas Rate Settlement

WASHINGTON.—Southern Natural Gas Co. has received a rate increase amounting to about $5,000,000 per year in a settlement of a rate proceeding by the Federal Power Commission.

The settlement reduced the amount of the requested wholesale natural gas rate increase of Southern Natural by about $956,000. The originally proposed rate increase has been in effect since last September 2 and the company will be required to refund to its customers the difference between the proposed rate and the approved rate.

Under the rate settlement, Southern Natural must present specific data on its zone rates and differentials between zones at its next rate proceeding, and must file changes in its rate schedules to reflect any reductions in the cost of gas purchased from United Gas Pipe Line Co. as a result of pending rate proceedings and make appropriate refunds to its customers.

Texas Eastern Delivery Increases Are Approved

WASHINGTON.—Texas Eastern Transmission Corp. has been authorized to increase natural-gas deliveries to several existing customers under its short term service and winter peaking service rate schedules in a decision filed by presiding examiner Emery J. Woodall of the Federal Power Commission.

The authorization is subject to review by the commission. Last October 23, the commission granted Texas Eastern temporary authorization to make the sales and deliveries as proposed. The company proposes to make the additional gas available under its short-term firm service rate schedule for a year from November 1, 1953, and under its winter peaking service rate schedule for the period, November 1, 1953, through March 31, 1954.

Montana-Dakota Utilities Plans Expansion Project

WASHINGTON.—Montana-Dakota Utilities Co. has applied for Federal Power Commission authority to construct about $789,676 of new pipeline facilities. The new facilities would enable it to purchase additional natural gas from Slick Creek and Manderson fields in the Big Horn basin of Wyoming and sell 15,000 M.c.f. daily of gas to Montana Power Co.

Montana-Dakota plans to build about 4 miles of pipeline in Big Horn County, Wyoming, and a metering station in Carbon County, Montana, to measure gas sold to Montana Power. It also proposes to lease a 2,640-hp. compressor station in Big Horn County, Montana, to be built by Montana-Wyoming Gas Pipe Line Co.

Natural Gasoline

Gasoline Plant Purchase Planned By Railway Firm

CHICAGO. — Chicago North Shore Systems, Inc., parent company of Chicago North Shore & Milwaukee Railway and several local transportation companies in Illinois and Wisconsin, has been authorized by its directors to negotiate for purchase of Wilmington Gasoline Co., Los Angeles.

Wilmington Gasoline, wholly owned by Mohawk Petroleum Corp., San Francisco, owns a gas absorption plant in Wilmington field with a capacity of 50,000 M.c.f. daily. Output of the plant is 65,000 gal. of gasoline and 60,000 gal. of butane and lighter products daily.

Firm Dismantling Old Natural-Gasoline Plant

EARLSBORO, Okla. — Sunray Oil Corp.'s natural-gasoline plant here which was sold to Heat & Power Co., Inc., of New York City in February, is being dismantled.

Heat & Power officials said much of the equipment in the plant is usable by eastern chemical plants.

The plant, built in 1928 for Barnsdall Oil Co., has been shut down since last summer. The plant was capable of producing 300 bbl. per day of products, including natural gasoline and liquefied petroleum gases.

Almost 3 miles **DEEP** *in a Texas well*

HIGH-PRESSURE CASING JOB "OK" WITH UNAFLO*

CEMENTING THEIR DEEPEST SINGLE STRING in the Gulf Coast area (7" casing at 14,595') on the McFaddin Trust No. 1 well near Port Arthur, Texas, the Magnolia Petroleum Company encountered hydrostatic pressure of 13,000 psi...bottom hole temperature 246°F. With an annular space of only 11/16", Unaflo—the oil-well cement with the *retarded* set—stayed fluid and pumpable.

Magnolia used 325 sacks of Unaflo for this tough section of their deep well, and got a good job without a hitch. For the same reliable performance in your next well . . . be sure to specify Unaflo Oil-Well Cement. It protects your investment 3 ways:

EASY PUMPING—Unaflo's high initial fluidity makes pumping easier right from the start.

SUSTAINED FLUIDITY—Unaflo stays fluid and pumpable throughout the retardation period. It's not just another slow-setting cement. The set is postponed; gives ample time to get cement in place.

HARDENS NORMALLY — Unaflo, after its retarded period, makes a strong tight seal, resistant to sulfate waters.

SEND FOR FREE BULLETIN—Gives latest authoritative tables of Unaflo performance. Write: Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

Magnolia's McFaddin Trust No. 1 Block B in the heart of Texas' Gulf Coast oil fields near Port Arthur. Unaflo Oil Well Cement met problems of pressure, heat, small annular space.

"UNAFLO" is the registered trade mark of the retarded oil-well cement manufactured by Universal Atlas Cement Company

MINNEAPOLIS • WACO • KANSAS CITY • BIRMINGHAM • CHICAGO • NEW YORK • Export Distributor: United States Steel Export Co., New York

Universal Atlas Cement Company

OIL-FIELD CEMENTS

Unaflo *Retarded* Oil-Well Cement
Resistant to Sulfate Waters

Atlas Portland Cement—Type I

Atlas Portland Cement—Type II
Resistant to Sulfate Waters

Atlas High-Early Cement—Type III

OG-1-130R

UNITED STATES STEEL HOUR—Televised alternate weeks—See your newspaper for time and station.

EXPLORATION

Pembina . . . A New Giant

by Frank J. Gardner

WESTERN Canada is witnessing the development of an oil field whose proportions have inspired predictions that stagger the imagination, and the field is only 9 months old. And production is coming from a Cretaceous sand body at 5,200 ft. that had not produced oil before.

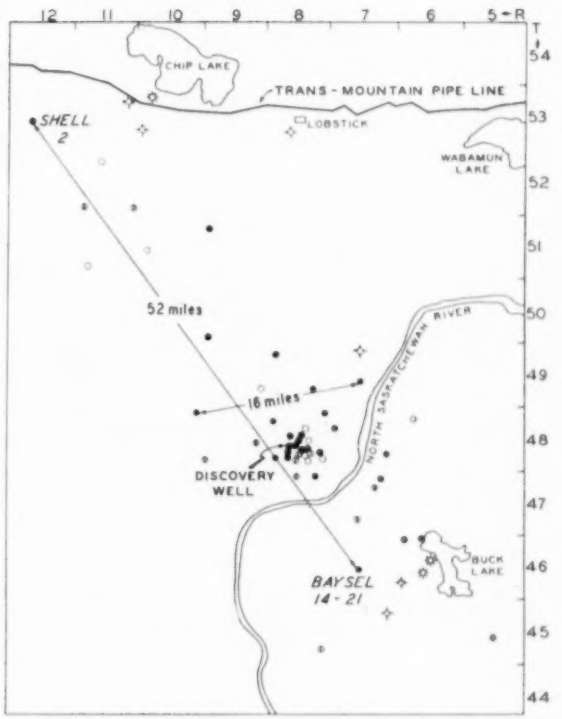
Situated in West Central Alberta, 65 miles west-southwest of Edmonton, and 150 miles north-northwest of Calgary, Pembina field had a quiet beginning. Gas production had been established at Chip Lake and at Buck Lake (see map) from deep horizons and operators were searching in the area for Devonian oil. Socony-Vacuum Exploration Co., acting as operator, with a 50 per cent stake in the combined holdings of Seaboard Oil Co. of Delaware, Honolulu Oil Corp., Merrill Petroleums, Ltd., and Cancoll Oil & Gas, Ltd., drilled a Devonian wildcat there in early 1953. The well was carried to 9,425 ft., and after finding no oil in the Devonian, Socony-Vacuum received consent from its partners to try for production in the Cardium sand, an Upper Cretaceous horizon at 5,200 ft. that had not previously been regarded as an oil reservoir.

They succeeded. On June 17, 1953, Socony-Vacuum 1 Pembina was finished as a flowing well from the Cardium. It was a milestone in Canadian oil history.

Modest beginning . . . The discovery at Pembina drew no publicity and indeed little interest until late 1953; it had no official recognition until February 1954, when it was first set up on the Alberta public records as a new field with five producers. But as one stepout after another began to extend the field limits in all directions, it became apparent that another major oil field had been "stumbled upon."

Today, Pembina is a magic word in Canadian and United States oil circles. It is still too early to make estimates or predictions about its possibilities, but enough is known that three companies now seeking pipeline permits in the field have submitted reserve figures varying from 762,000,000 to 952,960,000 bbl. If that is true, and it is said the figures are conservative, Pembina reigns today as Canada's largest field.

Extent is uncertain . . . The initial stage of development in the field is just getting under way, actually, and the distribution of wells on the map indicates numerous gaps to be filled before even a preliminary outline of field limits will be feasible. It is not certain that the 52-mile stretch of territory between Shell Oil Co. 2 Peers and the Baysel et al. 14-21 well will prove productive from the Cardium, but each of the wells has indicated production. Between them, Stanolind Oil & Gas Co. has recently given tremendous impetus to the continuity of the reservoir with two Cardium wells on the most westerly margin of the field.



Pembina area of West Central Alberta; Cardium sand production has been indicated along a 52-mile strike. Locations in upper left corner will be important key to reservoir extent.

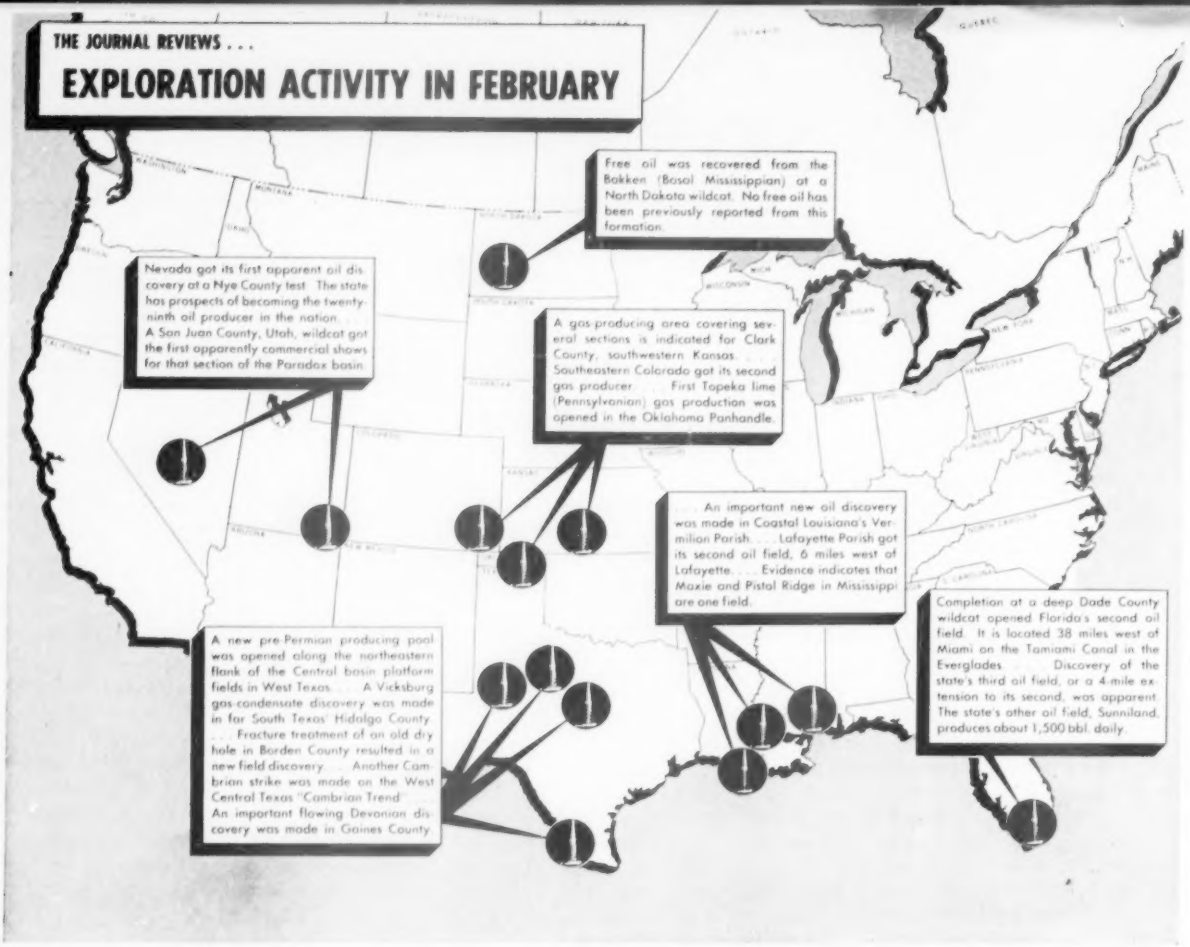
The attractions at Pembina are not limited to the widespread occurrence of the Cardium sand—oil has also been found in the Belly River, Viking, and basal Blairmore sands (all Cretaceous), and two wells have had excellent flows of oil and gas from the Mississippian.

Stratigraphically, the Cardium lies below the Belly River sand and above the Viking. The sand is characterized by relatively low porosity and permeability, but it responds readily to fracture treatment. These factors were an influence in the adoption of an 80-acre spacing pattern for the field. For the month of March, well allowables of 122 bbl. per day have been set by the Petroleum and Natural Gas Conservation Board.

The promise . . The multiple promise of pay sands, the excellent 37°-gravity crude, the blanket occurrence of the Cardium, the proximity of the Trans Mountain Pipe Line, and the relatively shallow producing depths have all added to the rapid rise of Pembina interest. Lease prices have soared and millions have been paid for townships along the 52-mile trend.

Strategic tests now are going down on the acreage recently taken by Imperial Oil, Ltd., (five locations in northwest corner of map). Imperial paid $11,000,000 for four townships here, and the five wildcats already staked will tell the story of Pembina, a field which **may** exceed anything else on the North American continent.

That it will be bigger than Leduc is assumed; that it will be bigger than Redwater is probable; that it will be bigger than any field in the United States is possible. Pembina is a magic word. Pembina is hard to believe.


THE JOURNAL REVIEWS . . .
EXPLORATION ACTIVITY IN FEBRUARY
Free oil was recovered from the Bakken (Basal Mississippian) at a North Dakota wildcat. No free oil has been previously reported from this formation.
Nevada got its first apparent oil discovery at a Nye County test. The state has prospects of becoming the twenty-ninth oil producer in the nation. . . . A San Juan County, Utah, wildcat got the first apparently commercial shows for that section of the Paradox basin.
A gas-producing area covering several sections is indicated for Clark County, southwestern Kansas. . . . Southeastern Colorado got its second gas producer. . . . First Topeka lime (Pennsylvanian) gas production was opened in the Oklahoma Panhandle.
An important new oil discovery was made in Coastal Louisiana's Vermilion Parish. . . . Lafayette Parish got its second oil field, 6 miles west of Lafayette. . . . Evidence indicates that Maxie and Pistol Ridge in Mississippi are one field.
Completion at a deep Dade County wildcat opened Florida's second oil field. It is located 38 miles west of Miami on the Tamiami Canal in the Everglades. . . . Discovery of the state's third oil field, or a 4-mile extension to its second, was apparent. The state's other oil field, Sunniland, produces about 1,500 bbl. daily.
A new pre-Permian producing pool was opened along the northeastern flank of the Central basin platform fields in West Texas. . . . A Vicksburg gas-condensate discovery was made in far South Texas' Hidalgo County. . . . Fracture treatment of an old dry hole in Borden County resulted in a new field discovery. . . . Another Cambrian strike was made on the West Central Texas "Cambrian Trend". . . . An important flowing Devonian discovery was made in Gaines County.

Nevada Strike Highlights February News

by John C. McCaslin

TOTAL completions in the United States in February showed a 18.5 per cent drop from the previous month. Wildcat completions dropped 777, down 19 per cent from January figures.

The map highlights the most significant strikes of the month. They occurred in Nevada, Utah, the Hugoton embayment, West and South Texas, Coastal Louisiana, Mississippi, Florida, and North Dakota.

Shell Oil Co. 1 Eagle Springs unit recovered 30 bbl. of 26°-gravity oil to open the first apparently commercial oil production in Nevada. Additional oil was recovered on a test of a lower zone. The producing formation at the wildcat which is 65 miles southwest of Ely has not been identified, but is volcanic in nature.

Three States Natural Gas Co. reported a flow of 85 bbl. of high-gravity oil in 6 hours from the Hermosa (Pennsylvanian) at its San Juan County, Utah, wildcat. The Bluff Unit test is the first to show apparently commercial results in the Paradox basin of southeastern Utah.

Eastern Clark County, Kansas, has a big gas-producing area indicated by the results of two tests of United Producing Co. Two wells reported good flows from the Morrow (Pennsylvanian). The discovery well of Harper Ranch pool was opened last year with Marmaton (Pennsylvanian) gas production. Southwestern Exploration Co. recovered gas at the rate of 4,500 M.c.f. per day at the second well to find production in Baca County, Colorado's extension to Greenwood field in Kansas, a Lansing-Topeka producer. United Carbon Co. 9 Kelley, Northwest Eva pool well in Texas County, Oklahoma, Panhandle, gaged 2,700 M.c.f. of gas per day from the Topeka lime. The Topeka discovery is the fifth in recent months in the Hugoton area.

Hunt Oil Co. 1 White in Andrews County, Texas, is an Ellenburger discovery, flowing 129 bbl. of oil per hour for 3½ hours through 1-in. choke. Nearest Ellenburger production is 7 miles to the southwest at Shafter Lake field. Magutex-Ellenburger field is 17 miles to the southeast, and geologically, lies within the Midland basin. Sun Oil Co. 1 Murch opened Bloomberg gas-condensate field, 16 miles east of Rio Grande City. Open-flow potential of the Vicksburg well was calculated at 1,930 M.c.f. of gas per day plus 30 bbl. of condensate. J. E. Jones Drilling Co. recompleted 2 Miller as a flowing well from the lower Spraberry formation to become a new discovery 5 miles north of Good-Pennsylvanian field, 6 miles east of Spraberry field.

Skelly Oil Co. 3-B Boyd in North Dora field, Nolan County, flowed 73 bbl. of oil in 1 hour on test of the Cambrian. The "Cambrian Trend" of West Central Texas extends from Salt Flat field to the Bronte field area in Coke County, a distance of about 50 miles. Rowan Drilling Co. et al found flowing Devonian oil at its southeastern Gaines

Total February Completions, Exploration and Development

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
Ala.-Ga.-Fla.	11	2	1	8	1	1	8	0	1	0	66,845	13
Arkansas	49	37	0	12	22	20	7	0	0	0	151,801	48
California	190	133	4	53	49	68	31	22	14	6	955,241	232
Colorado	86	46	3	37	2	7	73	4	0	0	480,302	91
Illinois	201	118	0	83	72	129	0	0	0	0	507,273	361
Indiana	62	22	0	40	58	4	0	0	0	0	90,804	109
Kansas	289	152	16	121	33	249	7	0	0	0	978,653	389
Kentucky	81	46	5	30	65	16	0	0	0	0	158,282	75
Louisiana	203	122	17	64	49	16	25	42	51	20	1,495,816	359
North	86	58	11	17	48	12	12	11	3	0	314,596	167
South	117	64	6	47	1	4	13	31	48	20	1,181,220	192
Michigan	45	15	0	30	25	14	6	0	0	0	117,843	100
Mississippi	29	12	1	16	1	1	21	4	2	0	197,357	27
Montana	26	14	1	11	7	8	7	2	2	0	127,274	30
Nebraska	23	10	1	12	0	9	13	1	0	0	128,447	23
New Mexico	85	31	26	28	13	27	28	10	2	5	579,902	110
New York	40	20	0	20	40	0	0	0	0	0	28,000	35
North Dakota	11	6	0	5	3	1	0	6	1	0	71,511	27
Ohio	76	41	12	23	38	37	1	0	0	0	162,811	179
Oklahoma	673	448	25	200	242	300	73	47	10	1	2,397,309	729
Pennsylvania	99	25	35	39	54	3	41	1	0	0	352,784	170
South Dakota	1	0	0	1	0	1	0	0	0	0	4,346	5
Texas	1,353	770	86	497	341	479	331	142	38	22	6,287,447	1,042
N. Central (7-B & 9)	511	290	5	216	235	196	78	2	0	0	1,575,462	211
West (7-C & 8)	308	223	5	80	30	103	103	44	12	16	1,804,440	331
Panhandle (10)	56	29	14	13	10	42	3	1	0	0	191,929	51
East (5 & 6)	51	15	14	22	6	18	17	4	2	4	301,373	101
Gulf Coast (2 & 3)	212	109	28	75	13	41	71	67	19	1	1,427,610	197
Southwest (1 & 4)	215	104	20	91	47	79	59	24	5	1	986,633	151
Utah	2	1	0	1	0	0	1	0	1	0	16,970	19
West Virginia	39	7	26	6	17	20	1	1	0	0	113,890	161
Wyoming	120	83	3	34	18	33	57	12	0	0	605,505	165
Miscellaneous	§43	8	2	33	40	3	0	0	0	0	57,755	¶30
Total February 1954	3,837	†2,169	264	*1,404	1,190	1,446	731	294	122	54	16,134,168	‡4,529
Total January 1954	4,706	2,599	330	1,777	1,313	1,964	858	386	129	56	19,597,883	4,429
Cumulative 1954	8,543	4,768	594	3,181	2,503	3,410	1,589	680	251	110	35,732,051	
Cumulative 1953	7,455	3,774	528	3,153	2,178	3,104	1,300	589	227	57	30,836,996	
Western Canada	152	92	13	47							623,398	
Alberta	94	64	9	21							447,054	
Saskatchewan	34	12	1	21							101,079	
Manitoba	20	16	0	4							50,047	
B.C.-N.W.T.	4	0	3	1							25,218	

*Incl. 88 service wells: Kans. 13, N. Y. 20, Ohio 9, Okla. 19, Pa. 25, N. Tex. 2. †Incl. 38 condensate wells: Calif. 1, N. La. 1, S. La. 9, Miss. 2, Okla. 7, N. Tex. 2, Gulf Coast 7, S.W. Tex. 9. ‡Incl. all wells rigged up and/or drilling at month's end. §Incl. 2 oil, 2 gas, 31 dry, Tenn.; 6 oil, 2 dry, Mo.. ¶Incl. Tenn. 12, Mo. 10, Md. 3, Nev.-Ariz. 5.

. . . the Month's Wildcats

	Total	Oil	Gas	Dry	Footage	1954 Comp.	1954 Footage (1,000 ft.)	1953 Comp.	1953 Footage (1,000 ft.)
Ala.-Ga.-Fla.	9	1	1	7	54,864	18	98	17	88
Arkansas	8	1	0	7	24,023	20	62	18	83
California	52	5	1	46	250,376	99	484	112	523
Colo.-Utah-Wyo.-Mont.	56	8	1	47	320,662	135	785	106	594
Tri-States	57	1	0	56	114,305	117	224	145	291
Kansas	29	1	0	28	115,010	95	372	164	612
Louisiana	37	10	2	25	372,194	77	760	73	646
North	5	1	0	4	35,496	14	82	28	168
South	32	9	2	21	336,698	63	678	45	478
Michigan	21	0	0	21	50,043	49	107	40	98
Mississippi	13	2	0	11	87,616	23	152	42	313
Nebraska	7	1	0	6	39,770	19	106	25	130
New Mexico	25	3	0	22	240,085	37	310	32	213
North Dakota	4	0	0	4	8,139	10	33	10	61
Oklahoma	53	10	3	40	249,421	129	591	118	546
South Dakota	1	0	0	1	4,346	3	11	1	5
Texas	396	68	17	311	2,018,440	896	4,480	876	4,335
North Central	160	28	2	130	513,466	366	1,259	370	1,353
West	83	21	3	59	542,500	179	1,079	136	815
Panhandle	7	0	0	7	38,534	13	86	10	45
East	16	1	2	13	112,805	37	236	49	244
Gulf Coast	60	10	5	45	456,843	145	1,095	142	1,021
Southwest	70	8	5	57	354,292	156	725	169	857
Others	9	0	1	8	52,127	20	91	21	75
Total February 1954	777	111	26	640	4,001,421	1,747	8,666	1,800	8,613
Total January 1954	970	136	25	809	4,664,851				
Cumulative 1954	1,747	247	51	1,449	8,666,272	1,747	8,666		
Cumulative 1953	1,800	270	58	1,472	8,612,885			1,800	8,613

County wildcat. The oil was gaged at the rate of 110 bbl. per hour on one drill-stem test. The strike is 11 miles southeast of Seminole.

Houston Oil Co. of Texas 1 Godchaux, 15 miles south of Abbeville, flowed 386 bbl. of oil for a new oil discovery 6 miles from nearest production in South Erath field, South Louisiana. The Pistol Ridge and Maxie field area in southern Mississippi is one of the state's most active spots with six rigs running. Current developments indicate that the two fields make up a single, multiple-sand condensate field, the largest in the state in area. Oil production was added in one well, promising additional potentialities for development.

Commonwealth Oil Co. et al opened the Florida Peninsula's second oil pool at 1 Wiseheart-State. The discovery pumped oil at the rate of 60 bbl. plus 90 bbl. salt water daily from the Sunniland lime. Gulf Oil Corp. 1 State of Florida-Lease 340, 36 miles west of Miami, recovered more than 9,000 ft. of 22°-gravity oil on test of the Sunniland lime, promising the state a third oil pool. Whether the Gulf strike is on the same structure as Commonwealth's discovery has not been determined.

OKLAHOMA

Nomenclature Committee Names New State Pools

The Oklahoma Nomenclature Committee of the Mid-Continent Oil & Gas Association met recently to name new discoveries in the state.

Creek County has two new pools. Ned Biffle Drilling Co. and Earl Tarver 1 Mills, NE SE NW 23-14n-10e, an old well worked over, has been named West Edna pool. West Milfay pool was opened by Lotus Oil Co. and D&L Oil Co. 1-A Woods, NW NE SE 18-15n-7e. In Garfield County North Green Valley pool was opened at Womer-Bradley Oil Co. 1 Johnson, NW NW SE 26-22n-3w, as an oil producer.

Southeast Stratford pool is a new oil area in Garvin County, opened by John H. Bracken 1 Burns, SE SE NW 36-4n-3e. In Hughes County East Allen pool was opened by Worley & Polk Drilling Co. at 1 Patricia "A," NW NW SE 21-5n-9e, as an oil discovery. Northern Oklahoma's Kay County has a new oil pool at South Mervine, opened by H. Waggoner Drilling Co. 1 Lewis, NE NE NE 27-27n-3e.

In Central Oklahoma Southwest Avery oil pool was opened in Lincoln County at D&L Oil Co. 1 Hoyt, NE NE NE 17-16n-5e. West Beets-Rapp pool was opened for oil production in Okfuskee County at Kenneth Davis, Howard Stark, and Elroy McCaw 1 Beets, NE NE NW 36-13n-10e. Delaney Drilling Co. 1 Mayo, SW SE SW 14-18n-3e, Payne County, opened Middle Mehan pool.

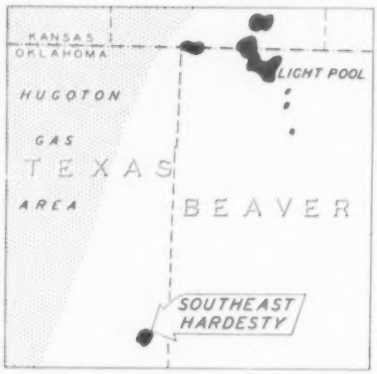
Northeast Maxwell oil pool was opened in Pontotoc County by Roy G. Steele 1 Kreiger, SE NW SE 6-5n-5e. Tecumseh pool was opened in Pottawatomie County for oil production at Blackwood & Nichols Co. 1 School Land "B," SW SE SW 13-9n-3e. Seminole County has two new oil pools. Glenn Drilling Co. 1 Fleet, NE NE NE 13-5n-6e, opened Southeast Tyrola pool, while Hall, Troup & Moore 1 Bowles, SE NW SW 10-6n-6e, opened South Dora pool.

Prairiedale oil pool was opened in Stephens County at Anson Petroleum Co. 1 Baker, NE NW NW 35-1n-5w. North Victory pool is Union Oil Co. of California's new Cisco sand oil pool in Tillman County at 2 Emenhiser, NW SE NE 23-3s-17w. Washita County has two new pools, one oil and one gas. South Rainey gas pool was opened by Huffman & Malloy 1 Greg, SE SE NW 35-8n-17w, and East Bessie oil pool was opened by Gulf Oil Corp. 1 Goeringer, C NE SE 28-11n-16w.

New Wells Added at Southeast Hardesty

The Texas Co. 1 Eldridge, SE SE NW 23-1n-19eCM, Texas County, flowed oil in 90 minutes, tanking 15 bbl. in 1 hour through ⅜-in. choke on drill-stem test of the Morrow sand at 6,826-77 ft.

The Texas Co. 1 Blair, C SE NW 24-1n-19eCM, was treated to flow 1,450 M.c.f. of gas per day on Morrow sand tests. American Gas Production 1 Silsbee added another producer to the important new area, flowing 3,500 M.c.f. of gas per day with some distillate showing.



The new Morrow sand producing area in the southeastern corner of Texas County in the Oklahoma Panhandle is enjoying a busy development program.

January New Strikes

The following new extensions, new pays, and wildcat discoveries were added to Oklahoma producing areas in January:

West Lindsay pool was opened in Garvin County by Vickers Explorations, Ltd., at 1 Sweeney, 7-4n-4w. The discovery flowed 41 bbl. of oil per day from the Hart sand. Gravity is 54°. Sun Oil Co. opened Southwest Byars pool in Garvin at 1 Caldwell, SW SE NE 4-4n-2e. The well flowed 357 bbl. of 41°-gravity oil per day from the Burns sand.

In McClain County Kenneth A. Ellison 1 Johnson "A," C SE NW 2-8n-4w, opened West Lindsay Ridge pool for 333 bbl. of oil per day from the first Bromide sand. Lincoln County's new Southwest Mt. Vernon pool was opened by Davidor & Davidor at 1 Neill, SE SE NE 16-15n-3e, flowing 720 bbl. of 37°-gravity oil per day from the lower Skinner sand.

Texas Pacific Coal & Oil Co. 1 Story, SE NW NW 1-17n-3e, Payne County, opened Northeast Cottingham pool with Skinner sand production. George Greer & San Juan Drilling Co. 1 Hammer opened Southwest Douglas pool in the NE NW NE 2-20n-5w, Garfield County. Production is from the Misener sand. In Noble County, NW SW NW 6-20n-1e, Kewanee Oil Co. 1 Stanislav opened Northwest Lone Elm pool with Layton sand production. South Cresent Star pool was opened in the NE NE NW 34-23n-5e, Pawnee County, by Signal Oil & Gas Co. at 1 Endicott. The pay is from second Wilcox sand.

New pay discoveries include Magnolia Petroleum Co.'s 1 Howell-Gragg, C NW SE 14-4n-5w, Grady County, which opened Springer sand oil production in Southeast Bradley pool. The Texas Co. 1 Dameron "B," C SE NE NW 14-5n-5e, Seminole County, opened Mayes lime oil produtcion in Wetley pool. Richard King et al 3 Admire, NW NW SW 24-12n-9e, Okfuskee County, opened Wayside sand pay in the Morse district. Bay Petroleum Corp. 1 Barker, SE SW NW 13-18n-3e, Payne County, opened pink lime oil production in Northeast Mehan pool.

Hughes Wildcat Has Small Booch Showing

A wildcat in Hughes County is drilling ahead after testing a showing in the Booch sand at 2,716-2,833 ft. The Ray P. Diehl 1 McCoin, S ESE NW 31-7n-9e, is 3 miles south of Holdenville where Booch sand production is reaching boom proportions in Grief Creek pool's western portions.

Howard L. Berkey 1 Harjo, NW SE SE 6-7n-9e, which revives Holdenville pool development, is a new operation for the Hughes County area. The test is ¼ mile south and one location east of the southernmost well in the two-well pool. W. N. Bartlett 1 Harjo, NE NW SE 6, opened the small pool several years ago for a small pump gage. Current development in Grief Creek pool is 1½ miles southeast of the Berkey 1 Harjo.

Deep Test Slatted in Northeastern Ellis Area

Lynn Drilling Co. and Carter Oil Co. have announced an 8,600-ft. wildcat in the northeastern part of Ellis County, in northwestern Oklahoma's Anadarko basin area.

The 1 Wisner, C SW NE 12-23n-23w, will be taken 200 ft. into the Mississippian. The wildcat will be remote, as no previous tests have been put down within several miles.

Revival at Northeast Uncas Pool Successful

Northeast Uncas pool, opened in 1949, is undergoing a very successful revival program since the new extension area was opened recently at Orville H. Parker 1 McClaskey, NE NE NW 29-17n-4e, Kay County.

The extension well to older production flowed 244 bbl. of oil per day through 26/64-in. choke from Skinner sand perforations at 3,164-74 ft. Parker 3 Lane, another renewal well, is located in SE NW NE 29.

A. C. Lawson 1 Cales, SW SE SE 20-27n-4e, appears to be an excellent oil well off the east edge of the old pool. The well is flowing at the rate of 15 bbl. of oil per hour through ¼-in. choke from Bartlesville sand. L. W. Prunty has another well drilling to the west at 4 Cales, SE SE SW 20.

The discovery well of the pool, Dave Morgan 1 Cales, C N½ NE SW 20, completed in 1949, flowed 10 bbl. of oil per hour through ½-in. choke with 1,500 M.c.f. of gas from Bartlesville sand open hole. Devel-

opment after the opening of the pool in 1949 was without success until the recent stepout from production by Parker.

Development of Creek Pool Shows Good Success

Creek County's Northeast Newby pool, opened in 1944 and slow in developing, is undergoing a successful development revival. William Broadhurst 1 Brown, NE SW NE 2-14n-9e, flowed oil at the rate of 18 bbl. per hour from fractured Red Fork sand. The Red Fork was topped at 2,401 ft. Off the southwest edge of production Broadhurst has the 2 Miller under way in SW NE SE 2. The 1 Young et al, NE NW SW 2, went on the pump after swabbing 50 to 60 bbl. of oil per day.

Lincoln Discovery Makes High Initial

Fracture treatment caused high initial flow on completion of a new oil discovery 1 mile south of recently opened Southwest Mount Vernon pool in Lincoln County.

Davidor & Davidor 1 Wakley, NE NE SE 21-15n-3e, flowed 60 bbl. of new oil hourly on ¾-in. choke after fracturing of lower Skinner sand perforations at 4,294-4,304 ft. Pinched down on a 12/64-in. choke the well flowed 8 bbl. of oil per hour.

ARKANSAS

Stephens Field Gets Pettit Oil Strike

Pan American Engineering Co. has completed a Pettit oil well on the south flank of Columbia County's Stephens field.

The new pay discovery, the 1 Thomas et al, NW SE 6-16s-19w, 1⅛ miles north of Pettit production in McNeil field, pumped 50 bl. of 43°-gravity oil per day with no water from perforations at 3,544-52 ft.

APPALACHIAN AREA

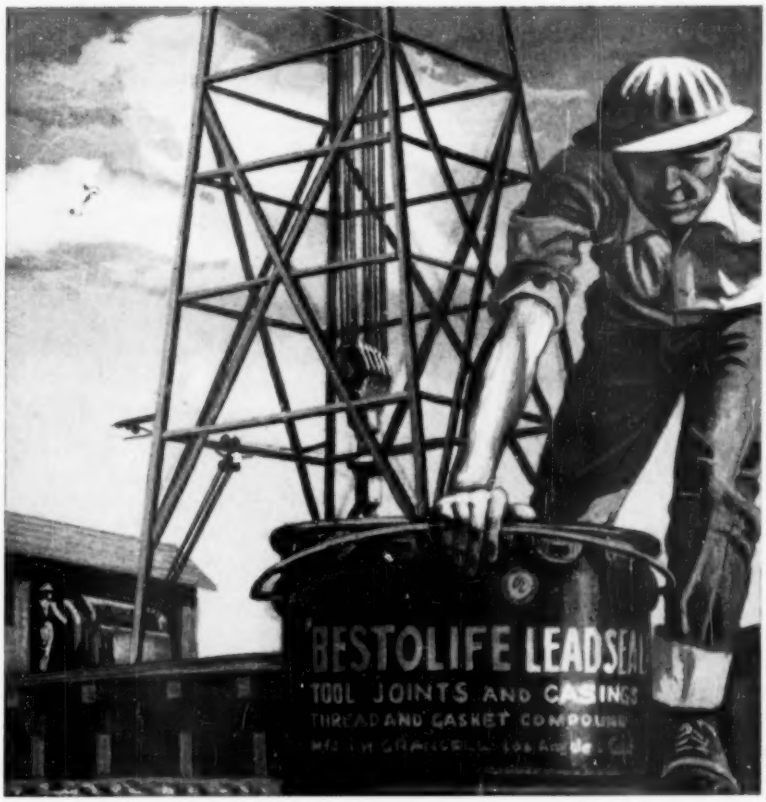
WEST VIRGINIA

Pocatalico district, Putnam County, West Virginia, Heizer Gas Co. 1-6-1110 Oscar Hedrick wildcat gaged 516,000 cu. ft., gas, Corniferous lime 4,545 ft., Oriskany sand 4,636-4,661 ft., gas 4,640-4,651 ft., TD 4,661 ft. Williams district, Wood County, South Penn Oil Co. 1 J. Lee Taylor, elevation 808 ft., was dry, Corniferous lime 4,577 ft., Oriskany sand 4,723 ft., show of oil 4,729-4,741 ft., TD 4,790 ft. Middle Fork district, Randolph County, Washington Natural Gas Co., located 1 E. S. Newlon, wildcat, elevation 2,010 ft., Sago Quadrangle 5.40 miles south of latitude 38 degrees 55 minutes and .28 mile west of longitude 80 degrees 05 minutes.

OHIO

The new gas pool in the south part of Royalton Township, Cuyahoga County, now has production from three sands. The H. A. Demsey et al 1 Lillian Sweeney, Lot 15, found the Oriskany at 1,925-1,941 ft. and at 1,952-1,956 ft. with pays in both totaling 1,150,000 cu. ft. natural.

The results of the B. H. Putnam et al 1 C. A. Coffman, Section 13, Watertown Township, Washington County, indicate that the



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double shot method of completing gas wells will make this area productive. Berea sand at 1,791-1,797 ft. made 200,000 cu. ft. natural and 1,000,000 cu. ft. when shut-in after second shot.

An additional producer was completed along the west edge of Mt. Zion pool in Jackson Township, Knox County. Mid East Oil Co. 5 R. E. Rusk, Section 24, made a good oil showing natural and 280 bbl. in 24 hours after fracturing.

KENTUCKY

WESTERN KENTUCKY

William E. Styles & Associates 1 Mrs. Addielee Gabhart, 11-P-21, Henderson County, swabbed 9 bbl. of oil per hour from the McClosky lime at 2,571-77 and 2,624-48 ft. after acid treatment. The new pool is located 1 mile south of Smith Mills and 9 miles west of Henderson.

EASTERN KENTUCKY

In Powell County and located on Sand Lick Creek Agatha Wireman has completed 8 Robert Boyd as a Corniferous producer of 4 bbl. of oil daily from a total depth of 972 ft. Top of formation was logged at 902 ft.

In the Pike County sector of Big Sandy gas field, United Fuel Gas Co. has completed 49 Kentland Coal & Coke Co. for an initial open flow gas well of 286,000 cu. ft. daily. Producing formation is the Devonian black shale topped at 3,590 ft. and bottomed at 4,523 ft. total depth. Well was shot with 6,400 lb. of gelatin.

ILLINOIS

In White County 3 miles due east of Carmi, Wm. H. Dickerson 1 Seal, NW NE NW 15-6s-10e, ½ mile from other oil wells, is swabbing 16 bbl. of oil per hour from the Rosiclare lime at 3,034-43 ft. after acidization. The Cypress and Aux Vases have good saturation at the well.

MICHIGAN

Coring in Richfield objective, and for the sand body which is producing oil at Reed City pool Richfield oil discovery well was scheduled to be under way at the C. C. Jetter & William deKrafft 1 Pfuhl, NE NE NE 25-18n-11w, Pinora Township, Lake County.

Well was being drilled below 4,555 ft. at last report with coring operations scheduled to be started at about 4,575 ft. The 1 Pfuhl will be the second Richfield objective test to follow discovery in this horizon at Pure Oil Co. 1 Gingrich, SE SE SW 30-19n-10w, Lincoln Township, Osceola County, ¾ mile to the southeast.

The Detroit River "sour zone" at the 1 Pfuhl was reportted to have reflected encouragement for possible porosity on drilling time. A strong odor of oil was reported in samples, but no test was run in this shallow objective. Coring plans in the Richfield call for the cutting of two cores, probably a total of 100 ft. It is expected that coring will be started so that the entire Richfield sand section will show in the cores.

Meanwhile, rework had now been definitely completed at Pure 1 Gingrich, Richfield discovery well, and production was reported to have averaged about 60 bbl. of oil a day on initial production test after long string of

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5-in. casing was cemented and hole was reworked.

The C. W. Jetter 1 R. Gingrich, NE NE NE 36-18n-11w, the first follow-up test to Pure's discovery to reach the Richfield, was still shut down with 5 in. casing cemented at 4,695 ft., waiting for cable tool clean-out unit. The 1 R. Gingrich, according to best information, showed little prospect in the Richfield, but did have an encouraging "sour zone" section which may be developed into commercial production.

CANADA

Near Peak Week Recorded in Area

Another near peak week has just passed in western Canadian petroleum industry, as six wildcats were chalked up as either oil or gas discoveries. In addition, operations at that same number of Canadian exploratory or extension wells gave up further encouragement.

Among the new strikes in the west during the past 7 days are two that yielded oil discovery and four that gave up natural gas. Included in the new gas finds are one new wet gasser and another that also showed some crude oil.

Alberta led the way again this week with four new finds (one oil and three gas), while Saskatchewan recorded an oil discovery and British Columbia another new gas strike.

This week Canadian Gulf Oil Co. found some approximate 25°-gravity crude oil in the detrital formation in the East Greencourt area of central west Alberta, 68 miles northwest of Edmonton and 9¾ miles east-northeast of the Fina-Cities Service 6-7 Greencourt wildcat that last week chalked up discovery of light-gravity oil in the Mississippian. A small recovery of clean oil was obtained at a depth below 4,705 ft. at the Gulf venture, and indications are that if this venture proves to be commercially productive from that horizon, it will be a marginal producer. Coring and testing was continuing over the week end. The well, Canadian Gulf 5-14 Blue Ridge, is located on LSD 5, 14-58-8w5.

The new wet gasser is on the Sarcee Indian Reserve, 13 miles southwest of Calgary and about 9 miles north of Turner Valley oil field, western Canada's first major oil field.

This well, Shell Home 1 Sarcee, is on LSD 12, 6-23-3w5.

Only one drill-stem test has so far been run in the Rundle section of the Mississippian, taking in a 22-ft. interval below 9,622 ft. Wet, sour gas flowed to the surface at rate of 500,000 cu. ft. daily, and recovery was a small amount of condensate. Coring is again under way.

One of the week's other gas strikes was made by Imperial in the Mirror area of central Alberta, 18 miles northwest of Stettler, 25 miles east of Lacombe, and 5 miles north of Nevis area wet gas wells. This well flowed gas from D3 Devonian coral reef which was totpped at 5,553 ft. at rates up to 6,360,000 cu. ft. daily, and also sprayed some oil to the surface. It appears that probably a noncommercial thin oil zone is present below the gas cap. The well, Imperial 12-16 Mirror, was being deepened, it is located on LSD 12, 16-40-22w4.

The other Alberta gas discovery was made by Sinclair Canada Oil Co. and Banff Oil, Ltd. The strike Sinclair Banff 1 Sexsmith Crown is on LSD 13, 20-74-6w6, in the Sexsmith area of northwest Alberta, 18 miles southwest of Grande Prairie. Drill-stem test in the Doe Creek horizon of the Dunegan formation, from 2-525-75 ft. flowed gas at rate just under 1,000,000 cu. ft. daily.

The Saskatchewan oil discovery was assured at the Canadian Gulf-Canadian Devonian 9 Quinn on LSD 9, 34-3-4w2, a wildcat in the Frobisher area, 23 miles northeast of Estevan, that last week was chalked up as a wet gas strike.

This well has penetrated 45 ft. of Mississippan water-free oil and gas zone, with the lower approximate 15 to 20 ft. probably being oil zone. Latest drill-stem test of the 5 ft. interval down to 4,660 ft. flowed clean approximate 40°-gravity oil for over 11 hours at different rates through various size chokes. It is understood from reliable sources, that, even though formation water has not been reached, that plans call for completion of this well at current total depth.

The British Columbia discovery was made by the Pacific Petroleums group in the Fort St. John area of northeastern British Columbia. The discovery well, Pacific 35 Fort St. John, LSD 9, 36-85-22w6, is 16 miles northwest of the group's No. 14 gas well and 62 miles northwest of Dawson Creek. This well, like the No. 14, found its gas in the "D" zone of the Triassic. A 1½-hour drill-stem test at bottom 5,573 ft. flowed gas at rate 2,650,000 cu. ft. daily and gave a recovery of 80 ft. of naphtha and 90 ft. of gas-cut mud. Hole is scheduled for completion as a gas well in that horizon.

EASTERN CANADA

Gaspe . . . In the Gaspe Peninsula, Quebec Province, the 1 Tar Point has completed repairs and is shut in for a pressure test on gas coming from the 7,069-ft. zone. The 1 asphalt base, on the Galt Brook dome, has resumed drilling from 2,055 ft. with a section of the lost cement bailer still to be drilled up. The well is still making oil from the 1,196-1,202-ft. horizon.

SOUTHEAST NEW MEXICO

Blowout at Delaware Basin Wildcat Raises Hopes

Continental Oil Co. 1 Bell Lake Unit, a Delaware basin wildcat located along its northeastern rim (see cut) in 31-23s-34e, drilled into a soft section around 12,604 ft., blew out and caught fire. While the fire destroyed the rig, it has also indicated the possibilities of deep production.

Tentative top on the Bone Springs in this well was 8,650 ft., on elevation of 3,632 ft. Lowest marker was the Wolfcamp at 11,516 ft. Operators reported penetration rate dropped to 8-12 minutes per foot at 12,604 ft. and was down to 2 minutes per foot when the blowout occurred at total depth of 12,616 ft.

Speculation was that the well might be in top of the Pennsylvanian, and the gas and distillate being sprayed from the well might represent a substantial pay formation. Operations were under way to extinguish the well at this writing.

Over the past few years the Delaware basin has received a number of deep exploratory tests, some of which produced gas and high-gravity oil, but not in economic quantities to substantiate the depth and drilling problems required.

Two Eddy County wildcats, within the Delaware basin, and also shown on the map are still on the active wildcat list after many months of testing. Richardson & Bass 1 Legg had total depth at 16,633 ft. and at last report was running a drill-stem test at 15,547-15,633 ft. This well had top of the Bone Springs at 7,532 ft.

Richardson & Bass 1 Harrison-Federal has made several gas flows, with small amounts of distillate. A test on perforations between 12,320-12,335 ft. flowed at the rate of 1,527,000 cu. ft. daily, plus an unestimated amount of distillate. The flow was through ⅜-in. choke, without acid. Total depth was 16,705 ft., plugged back to 12,343 ft.

Maljamar test . . . Buffalo Oil Co. 25 Baish, northwest of its Devonian discovery in this shallow area, has reported a substantial flow of oil from the Strawn section of the Pennsylvanian. On drill-stem test at 11,576-11,673 ft., oil flowed in 1 hour and 40 minutes, and in 3 hours through ⅝-in. surface choke, tanked 151 bbl. of 43° oil, with no water. Total depth is 11,673 ft.

Other possible producing sections in this well are the Wolfcamp which flowed oil between 8,960-95 ft., and the upper Pennsylvanian at 10,743-10,790 ft.

Gladiola area . . . H. M. Moss 1 Lowe-Gulf had prospects of a new Devonian structure, or extension to Gladiola field, on the basis of a drill-stem test in Devonian rocks at 12,290-12,345 ft. Recovery included 3,250 ft. of oil with no formation water. A previous test between 12,354-12,400 ft. developed sulfur water with no shows of oil. Location is 2 miles southwest of the southern tip of Gladiola field, but nearest production in the field is from the Wolfcamp.

KANSAS

January Discoveries

The following new pools, extensions, and new pays were announced for the state in January:

Mont-Sol pool was opened in Phillips County by Sohio Petroleum Co. 1 Krause, SE SE SE 1-4s-19w, with Kansas City lime production. Allphin Northwest pool was opened by Heathman-Seeligson 1 Waite, NW NW NE 32-10s-20w, Rooks County, with Arbuckle production. Lynd Southeast pool was opened also in Rooks by L. B. Stableford and K&E Drilling Co. 1 Ondrasek, SE NE SW 4-10s-19w, with Arbuckle production.

Carter Oil Co. opened up a new pay, the Lansing lime, in Eulert pool, Russell County. The discovery well is 2 Eulert, NE SW NE 34-11s-15w. The Texas Co. 1 Kisner, SW NE NE 13-22s-33w, Finney County, is an extension to Hugoton gas field. Glen oil pool was opened by Natural Gas & Oil and Oklahoma Exploration 1 Crissman in NW SW SE 14-23s-14w, Stafford County. Pay is from the Kansas City lime.

Banta Northeast pool was opened in King-

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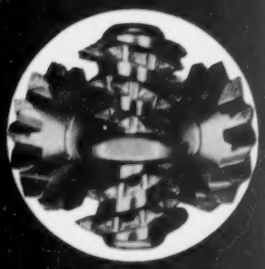

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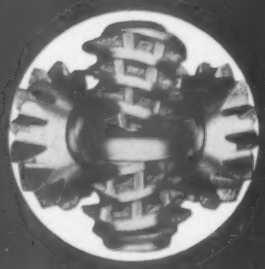

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For relatively non-abrasive formations such as shale, salt, red beds, soft limestone.

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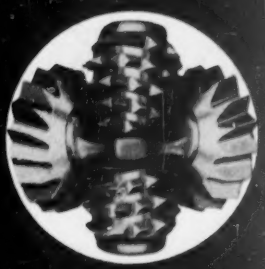
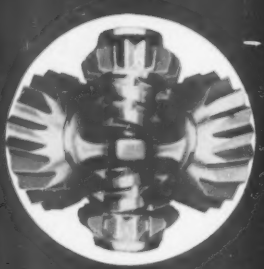
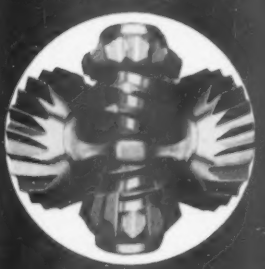


For medium formations such as chalk, gypsum, anhydrite, etc., where penetration is 10 to 25 feet per hour.

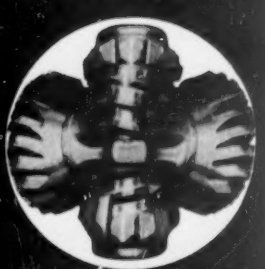
For medium hard formations where abrasive materials are encountered.



For moderately hard formations where a rate of penetration of 5 to 12 feet per hour is expected.



For heavy weight drilling of hard, abrasive formations like hard lime, chert, granite, and hard sands.



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man County by Pickrell Drilling Co. 1 Boyle "A," SW SE NE 27-30s-8w. Production is from the Mississippian. Bitter Creek pool was opened in Sumner County by Alpine Oil & Royalty Co. 1 Ramp, SW SW SW 1-35s-1e, with Mississippian production.

ROCKY MOUNTAIN

WYOMING

Fremont County Wildcat Flows

Skelly Oil Co. recovered 30 bbl. of oil in 6 hours of test of 1 Tribal, SW SW SW 36-6n-3w (WRM) northwest of Sheldon Dome, Fremont County. Test was of two perforated zones at 3,265-95 and 3,307-17 ft. in Curtis sand. Tops have not been reported and tests are continuing. Meanwhile the operator is drilling below 2,500 ft. at a confirmation well a quarter mile further northwest. The new pool is 4 miles northwest of Sheldon Dome proper.

Washakie County Extension Testing

Gulf Oil Corp. swabbed 8 bbl. of oil and 41 bbl. of water in 3-hour test of 1 Teeters, C SE NW 28-47n-93w, in the Fourteen Mile area, Washakie County. Earlier test of the same interval had gas at the rate of 133,500 cu. ft. per day with 11 bbl. of oil per day. Gulf had a deep Phosphoria discovery in this area in 1952, and recently abandoned a second wildcat in the general area. Exact zone being tested at 1 Teeters is not reported, but the formation is identified as Phosphoria.

Tip Top Gas Discovery Completed

General Petroleum Corp. has completed 18-20-G, SW SW SW 20-28n-113w, in the Tip Top area of Sublette County for a gage of 1,800,000 cu. ft. of gas with 20 bbl. of oil per day from second and third Frontier sands. Total depth of the wildcat is 8,401 ft. in Beckwith. The operator plugged back for completion in the shallower zone. Perforations are at 6,660-70 and 7,190-7,260 ft. The well is about 2½ miles south of General Petroleum's 1951 discovery in the Tip Top area which produced oil from Nugget at the rate of 266 bbl. per day. There is no previous production from Frontier in the area.

Campbell County Deep Wildcat Located

Great Basins Petroleum, Inc. has made location for a Pennsylvanian test north of Mitchell Creek in Campbell County. The well is 44-2 Government, C SE SE 2-55n-70w. It will test to about 8,000 ft.

COLORADO

Rangely Deep Test Said Nearing Objective

The Texas Co. is reported coring below 8,227 ft. and in or near Madison at 70-32 UPRR, SW NE NW 32-2n-102w, Rio Blanco County. It is the first test in the Rangely field to go below Weber, the principal producing formation in the field. The large reserves and considerable daily production (60,000 bbl.) at Rangely make the deep test one of the most potentially important in the area at the present time.

NORTH DAKOTA

First Heath Producer in Williston Basin Tested

Amerada Petroleum Corp. has completed the first producer from Heath sandstone in the Williston basin. The well, 1 Cheadle, SE NW 9-139n-100w, is the fourth well drilled in Fryburg field, Billings County. It was swabbed at the rate of 97 bbl. of 31.2°-gravity oil per day, and has since been shut in.

The well is the third in the field to find shows in Heath. It is also the first Madison failure in the field. It was drilled to a total depth of 9,495 ft., and plugged back for Heath completion when Madison tests were not encouraging. Top of Heath has not been reported. Perforations tested were of the zone 8,271-78 ft.

Several Heath shows (Big Snowy group—Mississippian) have been reported through the Williston basin, notably in East Poplar field, Roosevelt County, Montana, but no previous commercial completions have been made.

Four developments highlighted the week's activity in the Williston basin. Amerada Petroleum Corp. got its tenth discovery in North Dakota at 1 Lokken, 3 miles east of Tioga field (A on map). Sun Oil Co. et al are swabbing with no recovery at 1 Beagle Land and Livestock Co., North Sidney area wildcat in Richland County, Montana (B on map). Amerada completed 1 Cheadle in Fryburg field as the first Heath sand producer in North Dakota (C on map). Shell Oil Co. 34-33 NP, Cabin Creek extension well, tested at the rate of 111 bbl. of oil per day from a 116-ft. zone (D on map).

Wildcat Completed for New Pool East of Tioga Field

Amerada Petroleum Corp. reported a gage of 252 bbl. of oil and 88 of water per day on tests of 1 Lokken, NE SW 2-157n-94w, 3 miles east of Tioga field, Mountrail County. The new pool opener is reported lower structurally than producers in the field proper. Production is from Madison 8,420-30 ft. The well is the tenth discovery in North Dakota for Amerada.

MONTANA

Cabin Creek Extension Tested

Shell Oil Co. reported a flow of 11 bbl. of oil with 1 bbl. of water per day on test of 34-33 NP, NW SW SE 33-10n-58e, in the Cabin Creek area, Fallon County, Montana. Test was through perforations in the interval 8,922-9,124 ft. in Ordovician. The Cabin Creek discovery, 22-33 Unit, NW SE NW 33-10n-58e, produced at the rate of 244 bbl. per day from Ordovician only, but was rated at better than 4,000 bbl. per day by the operator on combined tests of Ordovician and Silurian. Shell has already perforated and acidized a second 8,357-8,557 ft. in the extension, and will test the higher zone.

At 11-33 Unit, SE NW NW 33-10n-58e, a northwest offset to the discovery Shell is preparing to perforate Ordovician after plugging back to 9,160 ft. from total depth of 10,342 ft. This well made inert gas at a rate of more than 6,000 M.c.f. per day from the interval 10,086-10,122 ft. Tops have not been reported at either of the two current wells.

North Sidney Wildcat Swabbing

Sun Oil Co., and others have begun swabbing operations at 1 Beagle Land & Livestock, NE SW SW 17-23n-59e, north of Sidney in Richland County but without recovery at last report.

Oil-cut mud and some free oil was recovered on tests within a more than 400-ft. section of Madison lime. Tests in progress are of perforations 9,002-62 ft. Casing was landed at 9,435 ft., and if tests at the present depth are unsuccessful, the well will be continued to the original Ordovician objective at about 12,000 ft.

NEBRASKA

Dawes County Wildcats Abandoned

Two wells which were responsible for a considerable amount of recent attention to the Chadron Arch area of western Nebraska have been abandoned without shows.

Cree Drilling, Inc. had no shows on tests of the zone 4,308-20 ft. at 1 State, C SE SE 16-29n-49w, Dawes County. The well reached total depth of 5,008 ft. several weeks ago, but was only recently tested. Three drilling breaks, plus favorable indications of log of three sections which were identified as sand probably of Permian age were to be tested. The operator perforated the lower of these sections, and acidized and swabbed without shows. The upper zones were not tested, and the tests indicated that the zones were apparently salt.

The wildcat was drilled on farmout from Shell Oil and was responsible for a considerable leasing program in the area south of Chadron. Shell also staked a west offset to the Cree well at 1 State, SE SW SE 16-29n-49w. Circulation was lost at about 4,184 ft. and the well was abandoned at 4,192 ft. total depth. At this depth Shell reported the well in Big Blue (Permian).

INDIANA

F. B. Cline has set casing on the Devonian limestone at 2 Farr-Strawn, 9-9n-8w, a 3-mile wildcat in Sullivan County, 3 miles southeast of Farmersburg.

Charles Bury-Johnson Beare-Caroll Bayler 1 Lynch-Fithian unit, Militia Donation 60-1s-10w, Gibson County, has been completed for 600 bbl. of oil per day from the McClosky lime at 1,839-43 ft. after acid treatment. It produced 5,100 bbl. of oil the first 8 days after drilling plug. It is located 7 miles northeast of Princeton.

TEXAS

WEST TEXAS

Discovery Offset Running Low on First Pay Zone

Cities Service Oil Co. 1-K Cummins, northwest offset to the company's Fusselman and Ellenburger discovery in northwestern Ector County, was reported 160 ft. low on top of the Fusselman pay. However, a drill-stem test in that formation from 7,932-60 ft. had flowing oil in 32 minutes which gaged nearly 13 bbl. of oil the first 30 minutes. Sample-top on the Fusselman was 7,940 ft., minus 4,658 ft.

Kent County . . . Canyon sand pay has been opened in the S-M-S Canyon reef field, northwest of Salt Creek field, at Blanco Oil Co. and Newman Bros. Drilling Co. 2 Swenson. This well failed to find pay in the reef, in drilling to 6,850 ft. but plugged back to flow 166 bbl. of oil a day through 14/64-in. choke from sand pay at 6,117-32 ft.

According to field sources, the discovery of reef pay has been making water and operators were considering a rework job to recomplete as a sand producer. Stanolind Oil & Gas Co. 1-A Neustadt, west offset to the discovery, failed as a reef well and will try for completion in the Canyon sand.

Andrews Discovery Is Completed

Hunt Oil Co. 1 Whitet, multipay discovery 11 miles north of Andrews, has been completed in the Ellenburger for a daily potential of 496 bbl. of 44° oil. Production was through 12/64-in. choke, from perforations at 13,272-13,322 ft. Sample top on the Ellenburger was 13,200 ft. This well also showed for possible production from the Glorietta, Clear Fork,

Cambrian Trend Map Available

Southwest Mapping Co., Fort Worth, has issued a Cambrian Trend map which shows the Cambrian producing areas through Coke, Nolan and Fisher counties. Map data includes surveys, current field development, and all wells that have been drilled to the Cambrian are encircled in red. Scale is 1 inch to 8,000 ft.

SOUTHWEST TEXAS

Atascosa County Wildcat Opens New Navarro Field

Carter & Carter's new Navarro oil-discovery well, 1 Brauchle, 4 miles northwest of Charlotte, in Atascosa County, is reported to be flowing at the rate of 8 bbl. per hour after fracturing pay zone in open hole at 4,290-317 ft. Flowing pressure gaged 300 psi.

The well's location, in CCI&M Survey 64, is 2 miles northwest of another Navarro discovery well recently completed by the same operators. The latter producer, 1 Prassel, opened KMC field.

San Antonio Bay Gets New Deep Wildcat Test

San Antonio Bay is to be the scene of another deep wildcat test to be drilled by Humble Oil & Refining Co. Location, in State Tract 114, on the Calhoun County side of the bay, is about 2½ miles offshore, and about the same distance northeast of San Antonio Bay field. It is about 11.7 miles northeast of Austwell. Projected depth is 10,000 ft.

TEXAS PANHANDLE

Pennsylvanian Oil Shows Reported in Hansford County

Humble Oil & Refining Co. 1 Hart, 4½ miles southeast of Hitchland in Hansford County, ran casing to 4,638 ft. after showing oil on a drill-stem test in Douglas sand. The 1-hour test at 4,635-52 ft. had gas at the top in 10 minutes and recovered 60 ft. of free oil.

Northeast of Hansford, R. H. Fulton 1 Matthews continued testing through perforations at 7,062-74 ft. Gas flow, after acid treatment, was 1,517,000 cu. ft. in 24 hours. Top of the Morrow was 7,043 ft.

Humble 1 Stratford Gas Unit, formerly 1 Hannah Morris, 7 miles northwest of Stratford in Sherman County, continued testing through perforations in the Mississippian at 4,855-77 ft. Ten hours of swabbing developed 3.64 bbl. of oil.

TEXAS GULF COAST

New Indian Hills Well

Productive area of Indian Hills field, in northern Harris County, continues to spread. Newest extension is 730 ft. to the east and south with completion by Federal Royalty Co. of its 1 Miller, which flowed at the rate of 95.21 bbl. of 38.6°-gravity oil daily on tests through ⅜-in. choke. Pay interval is 5,549-53 ft.

Development Spreads in Southeast Tomball Area

Development in the newly opened Southeast Tomball area, northern Harris County, has resulted in the completion the past week of the first confirmation producer and one dry hole. Four additional wells are drilling.

Confirmation well is P. R. Rutherford's 1 Wilson, southwest offset to the discovery well, Newman Brothers Drilling Co. and Geotek Oil Co. 1 Ziegenhain.

It is waiting on potential gage after flowing an ungaged amount of 37°-gravity oil while cleaning. It is perforated at 5,845-47 ft. in the discovery well's Cockfield pay zone. The latter well's pay interval is 5,843-45 ft.

The first dry hole is W. R. Godsey 1 Luecke, 3,000 ft. northeast of the discovery well. It drilled to 5,996 ft. without commercial shows.

Rutherford is starting another well 933 ft. southeast of his confirmation producer on the same lease. The discovery operators are preparing to test their second well, 1 Rubacii, 3,300 ft. southeast of the initial producer. They are rigging up for 2 Ziegenhain, 933 ft. east of No. 1. Sinclair Oil & Gas Co. has just entered the area with a test, 1 Williams, starting 715 ft. west of the discovery producer.

New Pay Zone Opened

Regal Oil Co. has opened a new oil-producing pay zone in the North Charco area, Goliad County, where its 1 Ryan, in Wilcox sand at 7,821-25 ft., flowed 25.42 bbl. of net 43°-gravity oil daily through chokes. Tubing pressure gaged 1,575 psi. Location of the discovery is 3,500 ft. east of the area's gas-condensate production.

LOUISIANA

NORTH LOUISIANA

Discovery Well of Liberty Hill Finaled

Placid Oil Co. has opened Liberty Hill field, 3 miles east of Lucky gas field in Bienville Parish.

The 1 Southern Advance Bag & Paper Co., Inc. et al 1-A Unit, SE NW 8-15n-5w, flowed gas at the rate of 4,000 M.c.f. per day through ¾-in. choke on tubing from perforations in the Travis Peak sand at 8,454 to 8,470 ft. The well is shut-in pending pipeline connection, and no offsets have yet been staked.

Concordia Parish Has New Wilcox Sand Strike

Carter Oil Co. has completed 1 Lea Graham, C SW SW 45-5n-9e, Concordia Parish, for a new Wilcox sand field in the treacherous Wilcox trend of east-central Louisiana.

The new pool opener flowed 60 bbl. of oil per day with no water through 5/64-in. choke on official test. The new discovery lies ¾ mile northwest of Deer Park field, but is not an extension due to a dry hole drilled in 48-5n-9e, NW NE of section.

SOUTH LOUISIANA

Lafourche Parish Wildcat Tests Gas-Condensate Pay

Another gas and condensate field, located north of Thibodeaux, in Lafourche Parish, appears to have been uncovered by Paul F. Barnhart, Houston operator.

The indicated discovery well, 1 Levert, now being completed, flow an ungaged volume of gas with a spray of condensate during a preliminary drill-stem test of perforations at 10,552-58 ft. Working pressure gaged 3,750 psi.

Prior to testing, hole had been drilled to 13,106 ft.

CALIFORNIA

Deeper Sespe Pool Added at Oxnard

High-gravity, flowing oil production has been established at Oxnard field, Ventura County, about ½ mile northeast of the 6,300-ft. Sespe pool opened there last July. The new discovery, recorded by Lloyd Corp., Ltd. 1 W. R. Livingston, is producing from the Sespe (Oligocene) but at 3,000 ft. greater depth. Gravity of the crude is 32.1° as compared with 22° for that of the shallower McInnis pool.

Initial production of the new discovery was 600 bbl. daily, flowing through perforations at 9,988-10,022 ft. Flow was through a 16/64-in. bean, with tubing and casing pressures of 1,330 psi. The crude reportedly was of a type quite different from that being produced by Ventura Avenue and other nearby fields. It appeared to have a high lubricating oil content.

The test was the operator's first for its rather extensive holdings in the vicinity of Oxnard. Aside from the 10,570-ft. Standard of California 1 Lucas about 2½ miles southwest, it was the first test to drill below 10,000

ft. Standard 1 McInnis, ½ mile southwest and Standard 1 Livingston, ¾ mile east, were bottomed at about 9,600 ft. Relatively little thus is known about the complicated, faulted deep structure.

New Pool Added at Belgian Anticline

Pacific Western Oil Corp. 1 R-K was completed in NE SW 23-30s-21e to open a new Eocene sand pool 1 mile west of Kern County's Belgian Anticline field. Initial production was 147 bbl. of 28°-gravity crude daily, plus a 23 per cent cut, from perforated intervals in the third Point of Rocks sand between 5,690 and 5,825 ft. Flow was through a 41/64-in. choke, with a tubing pressure of 75 psi.

Two locations have been staked for the new pool which lies about 1 mile southeast of the Northwest Belgian Anticline area. Shell Oil Co. will drill 46-23 P.M.L. as an east offset and Honolulu Oil Corp. 5 Watson-C.C.M.O. will be a north offset.

Pyramid Hills Pool Extended

Norris Oil Co. was in process of completing 52-29 Oceanic Baylis as a ¼-mile southeast step out to the Pyramid Hills' new Orchard pool, Kings County. The extensioner was producing from two intervals in the Eocene, at 3,330-3,480 ft. and 4,346-68 ft. Both zones were being pumped at last reports, after the deeper Canoas pay flowed 39°-gravity crude at a 300 bbl. rate for a short period.

Redondo Beach Drilling Cleared

Zone variances to permit drilling on tracts of Redondo Improvement Co. in eastern Redondo Beach have been granted by its City Council. The area is on the northwest edge of Torrance field, outside the city areas in which oil drilling is prohibited by an initiative ordinance adopted in 1935.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Atascosa County: Beckman, Inc., 1 Ray Clark estate, R. J. Johnson Sur., A-1666. Dry. TD 2,304 ft.

W. A. Richardson, Jr., trustee, 2 Wilson, BS&F Sur. 1625. IP 182 BOPD, 11/64-in., 38°, open hole 5,424-74 ft. TD 5,474 ft. (New field-Bill Richardson.)

Bexar County: A. E. McKenzie 1 Turner, Angel Navarro Sur., A-12. Dry. TD 3,708 ft.

Duval County: Pearl, Stephenson & Hill 1 Peters, L. Munoz Sur. 22, A-345. Dry. TD 2,286 ft.

Gonzales County: Sutton Drilling Co. 1 Purswell, Robert Kelley Sur., A-307. Dry. TD 2,512 ft.

Hidalgo County: H. R. Smith 1 First National Bank of Cincinnati, Las Mestenas, Pititas y la Abra Grant. IP 8,600 M.c.f. daily with 33 BC per M.M.c.f., open flow, 48.3°, Frio 10,064-82 ft. (perforations). TD 10,167 ft. (New field.)

Jim Hogg County: K. D. Owen et al 1 Dodson et al, Blk. 9, AB&M Sur. 51, A-7. Dry. TD 1,870 ft.

Jim Wells County: Smith & Storey, Inc., 1 Rokohl, A. M. French Sur. 4, A-164. Dry. TD 6,135 ft.

Nueces County: C. G. Glasscock 2 Wilson,

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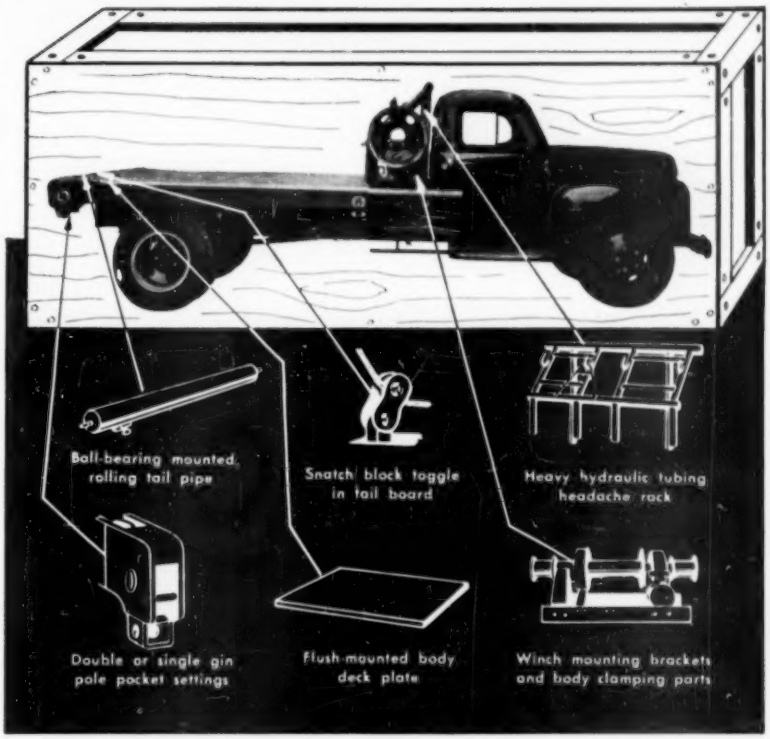
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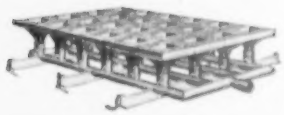

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WILDCAT COMPLETIONS

George H. Paul Subd. 14. IP 13,600 M.c.f. daily with 15.3 BC per M.M.c.f., open flow, perforations 5,354-59 ft. TD 6,105 ft. (New pay in East Robstown field.)

Arnold O. Morgan 1-33 Wood, City Blk. 110, Blk. 16, George H. Paul Subd., Driscoll Ranch. IP 126.25 BOPD, ⅜-in., 42°, perforations 5,555-80 ft. TD 5,594 ft. (New pay in East Robstown field.)

San Patricio County: Burdette Graham and H. C. Heldenfels, Jr., trustee, Tract 1, Share 1, John Smith Sur., A-234. Dry. TD 8,535 ft.

Ginther, Warren & Ginther 1 Ragsdale Brothers, Sec. 58, George H. Paul Subd., Coleman-Fulton Patsure. Dry. TD 6,025 ft.

Starr County: C. G. Glasscock and Pontiac Refining Corp. 4 Salinas, Share 3, Tract 1, Los Sacatosa Grant. Dry. TD 1,905 ft.

Webb County: W. F. Houser 2 Martin, trustee, Cabezon Pasture, Jose Vasquez Borrego Grant. Dry. TD 1,610 ft.

TEXAS GULF COAST

Brazoria County: Brazos Oil & Gas Co. and Ohio Oil Co. 1 State Tract "A," Alligator Point Unit 1, Tract 32, West Bay. Dry. TD 6,548 ft.

Colorado County: Rock Hill Oil Co. and Rodney De Lange 1 Johnson, BS&F Sur., A-639. Dry. TD 6,025 ft.

DeWitt County: Arkansas Fuel Oil Co. 2 Kuester, SA&MG Sur. 7, A-443. Dry. TD 8,518 ft.

Fort Bend County: Bass & Simmons 1-B Hundley, J. W. McCamby Sur., A-289. Dry. TD 8,215 ft.

Goliad County: McKenzie Drilling Co. et al 1 Conti, William D. Durham Sur., A-114. Dry. TD 4,460 ft.

Rhodes & Hicks Drilling Corp. 1 Yanta, Maria de Jesus Barvo Sur. A-51. Dry. TD 5,015 ft.

Harris County: C. B. Wrightsman and P. R. Rutherford 1 Arnold et al, David Harris Sur., A-26. Dry. TD 8,955 ft.

Jefferson County: San Jacinto Petroleum Corp. 1-A McFaddin, J. H. Garner Sur., A-126. Dry. TD 8,526 ft.

Kames County: Fitzpatrick Drilling Co. et al 1 McGrand, Carlos Martinez Sur., A-6. Dry. TD 7,617 ft.

H. R. Smith 1 Young, Carlos Martinez Grant, A-6. Dry. TD 8,502 ft.

Liberty County: General Crude Oil Co. 1 Mitchell, Peter Mason Sur., Tract 98. IP 10,750 M.c.f. daily, open-flow potential, perforations 11,391-454 ft. TD 11,525 ft. (New pay in Raywood field.)

Dan J. Harrison, Jr. 3-A Fee, H&TC Sur. 3, A-227. IP 14 BOPD, ⅛-in., 25°, Miocene 4,412-40 ft. (perforations). TD 6,150 ft. (New pay in, and extends Hankamer field.)

Matagorda County: Scurlock Oil Co. 1 Gulftex, Ira Ingram Sur. (Big Hill). Dry. TD 3,300 ft.

Wharton County: Progress Petroleum Co. of Texas 1 Peterson, Thomas Tatum Sur. 6, A-344. Dry. TD 4,636 ft.

EAST TEXAS

Anderson County: Sinclair Oil & Gas Co. 1 Royall National Bank, D. W. Bennett Sur., A-153. Dry. TD 5,802 ft.

Cherokee County: Bobby Manziel 1 Decker, S. R. Mallory Sur., A-609. Dry. TD 5,009 ft.

Kaufman County: American Liberty Oil Co. 1 Hall, Cyrena Kenady Sur., A-263. Dry. TD 4,430 ft.

Limestone County: T. W. Berry & Co. 1 Ward, P. Varela Sur. Dry. TD 3,025 ft.

Morris County: B. G. Byars 2 Pewitt, G. W. Dyer Sur. Dry. TD 4,775 ft. Elev. 305 ft., Paluxy 4,705 ft.

Navarro County: Jack A. Stroube 1 Stroube Fee, W. P. Kincannon Sur., A-452. Dry. TD 1,704 ft.

Smith County: Haynes B. Ownby Drilling Co. 1 McNutt, J. S. Martin Sur. Dry. TD 8,506 ft. Elev. 422 ft., Massive anhydrite 7,328 ft.

Wood County: A. O. Phillips 1 Fouse, Samuel Burch Sur., A-28. Dry. TD 7,510 ft.

WEST CENTRAL TEXAS

Brown County: J. M. Johnson 1 Barr, Samuel H. Crawford Sur., A-194. Dry. TD 3,212 ft.

Callahan County: M. S. Body 1 Connell, Sec. 26, BBB&C Sur. Dry. TD 1,924 ft.

Burt Drilling Co. 1 Shotwell, Sec. 55, BBB&C Sur. Dry. TD 4,186 ft.

Coleman County: Hovgard & Fitzgerald 1 Martin, Samuel Sprague Sur., Subd. 9. Dry. TD 3,434 ft.

J. Paul Karcher 1 Duncan, W. H. Warrock Sur., A-1228. IP 377,000 cu. ft. gas, pay 2,926 ft. TD 3,070 ft.

J. W. Marshall 1 Hickman, Blk. 3, J. Scott Sur. IP 10,500,000 cu. ft. gas, pay 1,821-31 ft. TD 2,010 ft.

Ted Weiner 1 Hector, G. W. Baker Sur. 2. Dry. TD 3,250 ft.

Haskell County: The Texas Co. 1 Beulah Branch, G. C. Alford Sur. 43, 6½ miles NW Rochester. IP 200 BOPD, ½-in., 40°, pay 4,985 ft. TD 5,040 ft.

Shackelford County: John J. Eisner 1 Snyder, Sec. 34, I.A.E. Sur. Dry. TD 4,102 ft.

M. J. Mitchell 1 Fite, Sec. 37, University Lands. Dry. TD 4,144 ft.

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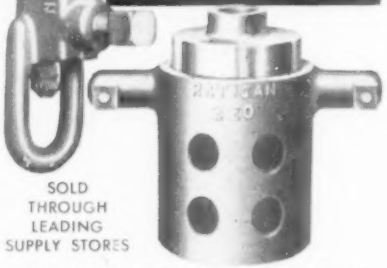

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Stonewall County: Hunt Oil Co. 1 Julia Bryan Young, Sec. 20, Wm. Vardeman CSL Sur. 347, IPP 8½ BOPD, 38°, pay 5,310 ft. TD 6,575 ft.

Ted Weiner 1 Letz, Sec. 12, BBB&C Sur. Dry. TD 5,980 ft.

Taylor County: Condor Petroleum Co. 1 Brown, 12-16-T&P. Dry. TD 3,250 ft.

S. C. Herring 1 Wilkinson, W. Friedlander Sur. 410. Dry. TD 4,361 ft.

Throckmorton County: W. M. Summer's 1-B Travis CSL, Blk. 55, Travis CSL, A-254. Dry. TD 4,717 ft.

NORTH TEXAS

Archer County: R. W. Darden Associates 1-H Richardson, Blk. 15, J. Scott Sur., A-374. Dry. TD 1,290 ft.

R. C. Tittle 2 Turbeville, Blk. 2, Jefferson CSL. Dry. TD 1,008 ft.

Baylor County: Wm. H. McCluskey 1 Hargrave, Blk. 3138, TE&L Sur. IPP 9½ BOPD, 39°, pay 1,434 ft. TD 1,452 ft.

Panhandle Oil Corp. 2 Hargrave, TE&L Sur. 3139. Dry. TD 1,461 ft.

Noel Pautsky 1 Smith, Upshur CSL Sur., A-557. Dry. TD 5,004 ft. Caddo 4,824 ft.

Clay County: Burt Oil Co. 1 Prescott-Rudolph, Patrick Gilliland Sur., A-162. Dry. TD 4,450 ft.

Texas Pacific Coal & Oil Co. 1 Hodges, A. Aaron Sur., A-2. Dry. TD 7,063 ft. Simpson 6,816 ft.

Wichita River Oil Corp. 1 Dubberly, Blk. 15, Hopkins CSL. IP 228 BO in 6 hours, 32/64-in., lower Caddo 5,788 ft. TD 6,034 ft. Extension.

Denton County: A. D. Beck 1 Muir, N. Coker Sur. Dry. TD 1,720 ft.

Foard County: Seaboard Oil Co. 1 Steele, 307-A-H&TC. Dry. TD 6,292 ft. Strawn 4,756 ft., Ellenburger 5,582 ft., granite wash 6,260 ft.

Grayson County: A. D. Britton 1 Wortham, M. B. Lamar Sur., A-704, 4 miles NE Whitesboro. IP 142 BOPD, 24/64-in., 40°, Strawn 6,419 ft. TD 7,450 ft.

Kay Kimbell 1 Allen, John Rich Sur., A-1034. Dry. TD 4,950 ft.

Shell Oil Co. 1 Steedman, T. Pillsbury Sur., A-942. IP 260 BOPD, 16/64-in., 34°, pay 6,995 ft., TD 8,000 ft.

Jack County: Walter L. Plemons Production Co. 2 Rhodes, M. E. Clark Sur., A-2105. Dry. TD 3,060 ft.

Montague County: Goldston Oil Corp. 1 Hudspeth heirs, Blk. 20, Jack CSL Sur. Dry. TD 6,720 ft.

Star Oil Co. 1 Morris, Blk. 63, Titus CSL Sur. Dry. TD 7,192 ft.

Texas Eastern Production Corp. 1 Watson heirs, Blk. 53, Wm. Watson Sur., A-838. Dry. TD 5,800 ft.

Wichita County: Tom B. Medders 1 Hospital, Cherokee CSL Sur. IP 654 BOPD, 30/64-in., 42°, Vogtsberger sand 4,751 ft. TD 4,758 ft.

Harry F. Snebold 1 Friberg, M. Carbajal Sur., A-44. Dry. TD 4,505 ft.

Wilbarger County: John & Pat O'Neal 4-P Waggoner, 1-13-H&TC. Dry. TD 1,975 ft.

Young County: J. K. Bailey 1 Kirby, Subd. 15, TE&L Sur., A-1232. Dry. TD 3,655 ft.

WEST TEXAS

Andrews County: Ralph Lowe 1 Deep Rock, 5-A46-PSL. 5 miles NW Andrews. IP 407 BOPD, 43°, Ellenburger 12,252 ft. TD 12,479 ft. Eev. estimated 3,206 ft., top Ellenburger 12,244 ft. Discovery.

Borden County: Texas Crude and Ponders Oil Co. 1-10 Simpson, 10-33-T3N-T&P. Dry. TD 8,835 ft. Elev. 2,739 ft., reef 8,790 ft.

Brewster County: Stuart & Spacek 1 Leuenthall, 87-341-TC Sur., 75 miles S Alpine. Dry. TD 2,504 ft. Elev. 2,456 ft., Buda lime 610 ft., Georgetown 894 ft., Edwards 1,572 ft.

Cochran County: Stanolind Oil & Gas Co. 1-D Reed, Sec. 58, Harrison & Brown Sur., 12 miles SE Bledsoe. IPP 98 BOPD, 38°, Devonian 11,861 ft. TD 12,742 ft.

Crockett County: Jack Holt 1 Humble-Martin, 38-OP-GC&SF. Dry. TD 1,310 ft.

Kent County: General Crude Oil Co. 82-1 Percy Jones, Tract 7, 82-G-W&NW Sur. Dry. TD 7,685 ft. Elev. 2,151 ft., Ellenburger 7,372 ft., pre-Cambrian 7,654 ft.

Lamb County: H. L. Cain 1 Gregg, 18-658-State Capitol Lands Sur. Dry. TD 4,290 ft.

Martin County: Seaboard Oil Co. of Delaware 1 Parker, 47-36-T-N-T&P. Dry. TD 8,026 ft. Elev. 2,739 ft., Spraberry 7,085 ft.

Pecos County: Brown & Thorp Drilling Co. 1 Iowa Realty Trust, 123-10-H&GN. Dry. TD 4,109 ft. Elev. 2,436 ft., Ellenburger 4,085 ft.

Gulf Oil Corp. 1-DU State, 7-28-University Lands. IP 7,250,000 cu. ft. gas, pay 2,552 ft. TD 3,000 ft.

Reeves County: Francis K. Campbell 1 Umbenhour, 5-59-PSL. Dry. TD 3,760 ft. Elev. 3,173 ft., Delaware sand 3,273 ft.

Carper Drilling Co. 1 Northrup, 32-56-T2-T&P, 1½ miles SE Orla. Dry. TD 3,267 ft. Elev. 2,846 ft., Delaware sand 3,049 ft.

Neville G. Penrose 1-A Allar Co., 18-56-T3-T&P, 9 miles SE Orla. IP 56 BOPD, 16/64-in., 38°, pay 3,471 ft.

Runnels County: Melvin Ochs 1 Workman, Henry G. Bliss Sur. Dry. TD 2,620 ft. Elev. 1,766 ft., McMillan 2,615 ft.

Schleicher County: Robert Page 1 Willoughby, 116-A-HE&WT. Dry. TD 800 ft.

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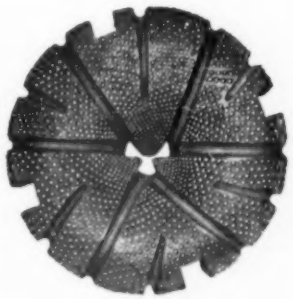
drilling problems



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THE OIL AND GAS JOURNAL

"Maybe I should leave it stuck—I didn't even have to use my brakes once all the way over here."

WILDCAT COMPLETIONS

Sutton County: Bill L. Holland 1 Sellman, 40-7-TW&NG. Dry. TD 5,005 ft.

Tom Green County: Diamond Drilling Co. 1 Dierschke, 51-11-SPRR. Dry. TD 5,810 ft. Elev. 1,897 ft., Ellenburger 5,677 ft.

P. Q. Echols 1-B Isaac Funk, 30-5-H&TC. IPP 22 BOPD, 35°, pay 860 ft. TD 870 ft.

Ward County: Cactus Drilling Co. 1 Wesson, 148-34-H&TC. Dry. TD 5,174 ft.

Yoakum County: Wellman & Sons et al 1-104 Fields, 104-D-J. H. Gibson Sur., IP 1,560 BOPD, 28/64-in., 44°, Devonian 12,040 ft. TD 12,107 ft.

SOUTHEAST NEW MEXICO

Eddy County: San Juan Oil Co. 1-B San Juan-State, 28-17s-28e. Dry. TD 10,746 ft. Elev. 3,696 ft., Pennsylvanian 7,850 ft., Mississippian 10,690 ft.

NORTHERN NEW MEXICO

Rio Arriba County, Lindrith area: Magnolia Petroleum Co. 4 Ingwersen-Federal, C SW SE 20-24n-2w. Dry. TD 8,464 ft. Temporarily abandoned in Entrada.

ILLINOIS

Christian County: Alfred Branyan 1 Scott, NE NE NE 14-15n-1w. Dry. TD 2,020 ft.

Calvert Drilling Co. 1 Mateer, NE NE SW 36-15n-2w. Dry. TD 1,996 ft.

Clay County: Sanders & Fye 1 McCollum, NE NE SW 9-4n-7e. Dry. TD 3,054 ft.

Clinton County: L. Kapp 1 Schomaker, SE SW SW 5-2n-2w. Dry. TD 1,189 ft.

Washington County: Dale Hopkins 1 Mitchell, NE NW SE 28-1n-1w. Dry. TD 1,500 ft.

INDIANA

Dubois County: P. L. Pitzer 1 Huebner, NW NW NW 19-1s-4w. Dry. TD 530 ft.

N. R. Dobb 1 Salb, SE NW SE 14-1s-5w. Dry. TD 820 ft.

Gibson County: Bury Drilling Co. 1 Fecthan-Lynch, Don. 60-1s-10w. IP pumped and flowed 500 bbl. oil a day, McClosky 1,839-43 ft. TD 1,888 ft. Discovery of Union, West pool.

Perry County: Indiana American Oil Co. 1 Henrickson, NE NE SE 23-5s-1w. Dry. TD 410 ft.

Sullivan County: F. B. Cline 1 Strawn, NW SW NE 9-9n-8w. Dry. TD 2,240 ft.

Cline 1 Brown, SW SW NW 9-9n-8w. Dry. TD 1,963 ft.

Cline 1 Larr-Strawn Comm., NW NE NW 9-9n-8w. Dry. TD 2,140 ft.

Vigo County: T. & H. Corp. 1 Liston, NW SW NE 27-10n-8w. Dry. TD 2,178 ft.

WESTERN KENTUCKY

McLean County: R. E. Stouder et al 1 Gunterman, SW NE SW 4-L-27. IPP 165 BOPD, Jackson sand. TD 2,673 ft. (Discovery well of Faith North pool.)

MICHIGAN

Mason County: McClure Oil Co. 1 Burke, SW SW SW 23-17n-15w. Dry. TD 2,513 ft. in Dundee-Monroe.

Washtenaw County: Sun Oil Co. 1 Manzel, NW NW NW 5-3s-4e. Dry. TD 1,411 ft. in Dundee.

WEST VIRGINIA

Putnam County, Pocatalico district: Heizer Gas Co. 1-L-1110 Oscar Hedrick, 516,000 cu. ft. gas, Corniferous lime 4,545 ft., Oriskany sand, 4,636-4,661 ft., gas 4,640-4,651 ft., TD 4,661 ft.

Wood County, Williams district: South Penn Oil Co. 1 J. Lee Taylor, elevation 808 ft. Dry. Corniferous lime 4,577 ft., Oriskany sand 4,723 ft., show oil 4,729-4,731 ft., TD 4,790 ft.

FLORIDA

Charlotte County: Gulf Oil Corp. 1 Vanderbilt, NW NE 35-41s-21e. Dry. TD 12,725

ALABAMA

Escambia County: Gulf Refining Co. 1 Atkinson, SW NE 28-1n-11e. Dry. TD 6,204 ft. Elev. 237 ft., lower Cretaceous 6,086 ft.

Monroe County: Helms et al 1 Belcher, NW SE 17-5n-6e. Dry. TD 5,376 ft. Elev. 359 ft., lower Tuscaloosa 5,164 ft.

MISSISSIPPI

Adams County: T. J. Glennon 1 Mary Boyd estate, 39-6n-3w. Dry. TD 6,686 ft. Elev. 270 ft., Wilcox 4,583 ft., base Baker shale 6,414 ft.

SOUTH LOUISIANA

Acadia Parish: Southern Minerals Corp. 2 Frey, 24-7s-1w. Dry. TD 4,508 ft.

Cameron Parish: The Texas Co. 1 State Lease 2,402, Township 13s-9w, in Calcasieu Lake. Dry. TD 7,983 ft.

Caroline Hunt Sands 1 State Lease 2,404, Township 14s-9w, in Calcasieu Lake. Dry. TD 11,100 ft.

Plaquemines Parish: Kerr-McGee Oil Industries, Inc., 1-BB State Lease 1998, Blk. 21, Breton Sound. IP 264 BOPD, 11/64-in., 28.7°, perforations 6,058-62 ft. TD 6,350 ft. (New field.)

D. E. Vasser and A. H. Howard 1 Moral, 31-20s-29e. Dry. TD 9,636 ft.

California Co. 2 State Lease 2410, Blk. 24, Main Pass area. IP 187 BOPD, 9/64-in., 28.1°, perforations 7,624-31 ft. TD 9,102 ft. (New pay in Main Pass Block 24 field.)

California Co. 33 State Lease 1958, Blk. 35, Main Pass area. IP 175 BOPD, 8/64-in., 27°, perforations 8,360-76 ft. TD 8,752 ft. (New pay in Main Pass Block 35 field.)

St. Charles Parish: Pan American Production Co. 5 Simoneaux, 20-14s-21e. IP 4,667 M.c.f. daily with 25 BC per M.M.c.f., ¼-in., 48.8°, perforations 11,018-23 ft. TD 12,114 ft. (New pay in Boutte field.)

St. John the Baptist Parish: J. Paul Ratliff, Jr. 1 Godchaux, Township 11s-7e. Dry. TD 10,850 ft.

St. Landry Parish: Ed E. Hurley 1 Morain, 18-4s-5e. Dry. TD 11,215 ft.

St. Martin Parish: Warren Petroleum Corp. 2 Voorhies, 73-9s-5e. IP 642 BOPD, 14/64-in., 33.3°, perforations 8,444-54 ft. TD 9,000 ft. (New pay in Anse La Butte field—northeast extension area.)

Terrebonne Parish: The Texas Co. 3-5 State Lease 725, Bay Junop Unit, 22-21s-13e. IP 308 BOPD, 9/64-in., 27.9°, perforations 12,817-23 ft. (New field and first oil production at Bay Junop salt dome.)

ARKANSAS

Union County: Austral Oil Exploration Co., Inc. and Lyons, McCord & Logan 1 McGraw, C NE NE SW 34-18s-16w. IPP 79 BOPD, 3,105-10 ft., Tuscaloosa, 44°, TD 7,896 ft.

OKLAHOMA

Carter County: Seaboard Oil Co. 3 Smith estate, SE NE SW 19-3s-1e. Dry. TD 13,299 ft.

Comanche County: Brown & Drew 1 State, W½ SW NW 36-1n-10w. Dry. TD 2,575 ft.

Creek County: E. L. Oliver 1 Willingham, SE SE SE 9-19n-8e. Dry. TD 2,640 ft.

Garfield County: C. McCaughey 1 Farm Cassody, SE SW NW 35-22n-3w. Dry. TD 2,550 ft.

Garvin County: Bill Webb et al 1 Lowe, SW SW NW 12-4n-3e. Dry. TD 2,199 ft.

Hughes County: Worley and Polk Drilling Co. 1 Patricia 1-A, E½ NW NE SE 21-5n-9e. IPP 65 BOPD, Allen sand 622-88 ft., 29.8°. TD 730 ft. (Oil discovery.)

Kay County: Royal Oil Co., Inc. 1 Burkett, NE NE NW 35-28n-2e. Dry. TD 3,625 ft.

L. C. Smitherman 1 State, SW SW NE 36-29n-1e. Dry. TD 3,786 ft.

Lincoln County: Mid-Continent Petroleum Corp. 1 Fair, NE NW SE 21-13n-4e. Dry. TD 4,368 ft.

Oil Capitol Corp. 1 Martin, SW NE SW 22-13n-6e. Dry. TD 4,408 ft.

Ben C. W. Hyde, Jr. 1 Kizzar, NW NW SE 22-15n-3e. Dry. TD 4,675 ft.

Logan County: Alpha Petroleum Co. 1 Jacks, NE NE SE 17-16n-1w. Dry. TD 5,763 ft.

Pawnee County: Lion Petroleum 1 School Land, SW SW NE 16-20n-5e. Dry. TD 3,482 ft.

Payne County: Wilcox Oil Co. 1 Anderson, SW NE NE 20-20n-3e. Dry. TD 4,229 ft.

Pottawatomie County: K. A. Ellison 1 Whitaker, SW NW NW 28-7n-3e. Dry. TD 5,180 ft.

Blackwood & Nichols 1 School Land "B," SW SE SW 13-9n-3e. IPP 21 BOPD, sandy dolomite 5,290-94 ft., 36°. TD 5,457 ft. (Oil discovery.)

Stephens County: An-Son Petroleum 1 Baker, NE NW NW 35-1n-5w. IPP 146 BOPD, Hoxbar 5,229-74 ft., 31°. TD 5,700 ft. (Oil discovery.)

Shebester, Toland & Reeves, Inc. 1 Tullous, NW NW NW 27-2n-9w. Dry. TD 2,400 ft.

Tillman County: Union Oil Co. of California 2 Emenhiser, NW SE NE 23-3s-17w. IPP 80 BOPD, Cisco sand 3,046-52 ft., 43.1°. TD 3,053 ft. (Oil discovery.)

KANSAS

Butler County: K. T. Wiedemann 1 Shields, NW NE SW 34-23s-5e. Dry. TD 2,685 ft.

Cowley County: Dilworth, Gleason & Uhl 1 Lewis, SW SW SE 26-34s-6e. Dry. TD 2,215 ft.

Ellis County: Derby Oil Co. 1 Philip, NW NW NE 3-15s-17w. Dry. TD 3,557 ft.

Ford County: Coppinger 1 Vice, SW SW NE 14-28s-21w. IP 7,600 M.c.f. of gas per day, Mississippian 5,056-74 ft. TD 5,230 ft. (Gas discovery.)

Logan County: Wycoff Bros. 1 Kough, NE NE SW 18-14s-34w. Dry. TD 1,020 ft.

Norton County: Henderson Oil Co. 1 Leichliter, SW SW NE 8-3s-25w. TD 3,958 ft.

Pawnee County: Petroleum, Inc. 1 Ackerman, NE SW SW 24-22s-15w. Dry. TD 4,060 ft.

Welch & Olsson 1 Kasselman, NW NW NE 14-23s-16w. Dry. TD 4,185 ft.

Trego County: Virginia Drilling Co. 1 Schimkowitsch, NW NW NW 36-11s-25w. Dry. TD 4,695 ft.

NORTH DAKOTA

Billings County, Fryburg: Amerada Petroleum Corp. 1 Cheadle, C SE NW 9-139n-100w. IPF 97 BOPD, Heath sand discovery, new pay. TD 9,495 ft.

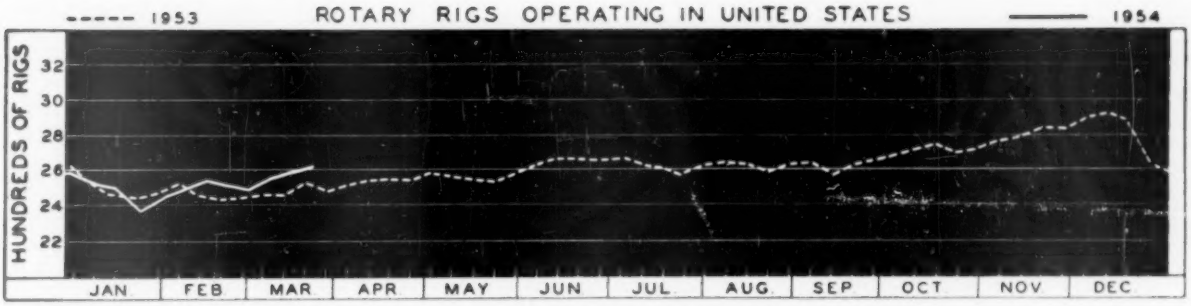
Mountrail County, Southeast Tioga: Amerada 1 Lokken, C NE SW 2-157n-94w. IPF 252 BOPD, Madison discovery, new field. TD 8,462 ft.

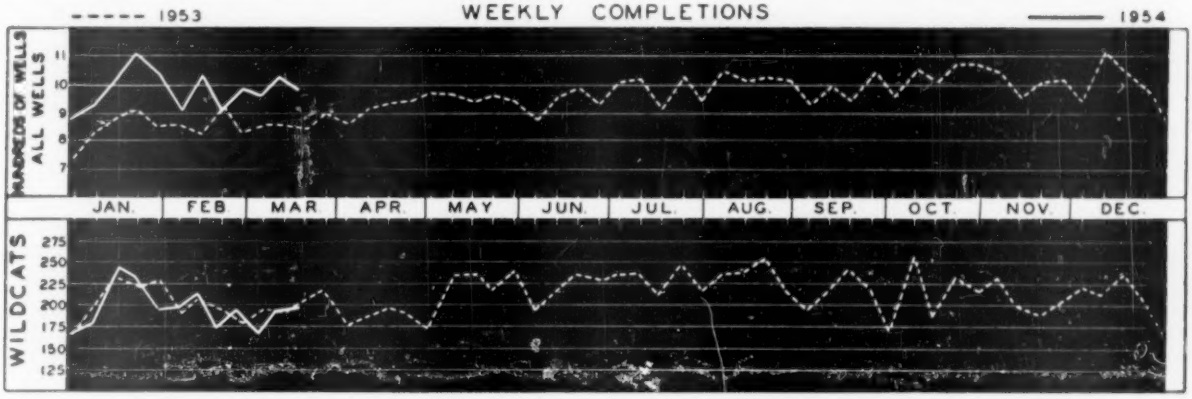
CALIFORNIA

Colusa County: R. S. Rheem, Opr. 1-36 Zumwalt, NW NE 36-18n-2w, IPF 1,450 M.c.f. gas, ¼-in. choke, perfs. 2,216-26 ft., TD 4,025 (Extension to Princeton gas field.)

Fresno County: Fowler Drilling Co. 16-9 L. Lytle-Noble, 9-16s-18e. Dry. TD 6,260 ft.

(Continued on page 189)





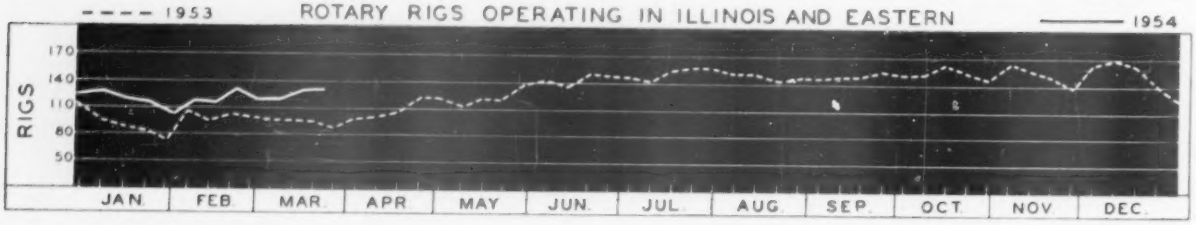
CURRENT STATISTICS

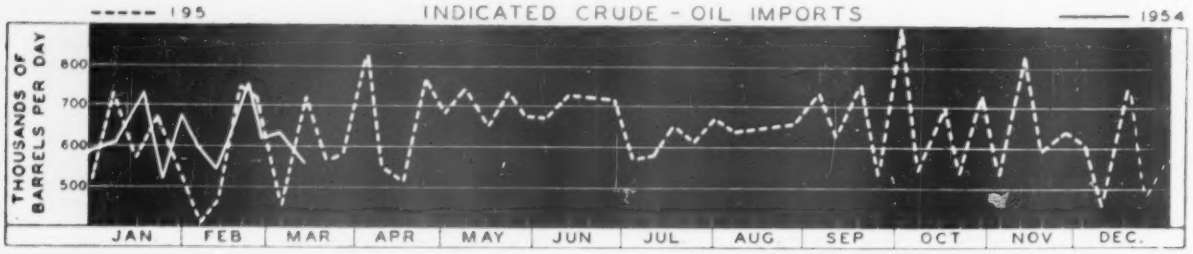
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MARCH 20, 1954

	Total of all wells					Mar. 20		Wildcat completions and discoveries					Cumulative total, 1954				
	Comp.	Oil	Gas	Dry	Footage	1954	1953	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Pennsylvania-New York	50	24	3	*23	79,200	522	484	0	0	0	0	0	0	0	1	8	9
West Virginia	16	1	12	3	48,415	120	106	0	0	1	1	2	0	0	6	4	10
Ohio	21	8	3	†10	42,101	232	213	0	0	0	0	0	0	0	2	1	3
Indiana	16	4	0	12	24,668	159	258	1	0	0	7	8	3	0	0	39	42
Kentucky	17	10	3	4	35,838	238	213	1	0	0	0	1	5	0	0	25	30
Illinois	40	24	0	16	102,437	546	388	0	0	0	5	5	0	0	0	88	88
Michigan	7	3	0	4	16,191	131	120	0	0	0	2	2	0	0	0	58	58
Kansas	75	39	12	‡24	242,700	936	1,011	0	0	1	8	9	14	0	4	114	132
Nebraska	2	2	0	0	11,290	76	61	0	0	0	0	0	5	0	0	18	23
Oklahoma	154	93	2	§59	502,378	2,050	1,518	4	0	0	15	19	27	2	7	138	174
Texas	361	229	20	112	1,679,416	3,886	3,610	15	2	4	72	93	164	21	38	891	1,114
North Central (Dist. 7-B & 9)	147	97	4	46	505,394	1,419	1,288	7	0	2	28	37	82	2	5	346	435
West (Dist. 7-C & 8)	76	53	3	20	438,591	904	824	5	0	1	14	20	48	0	6	165	219
Panhandle (Dist. 10)	15	10	5	0	49,607	191	177	0	0	0	0	0	0	0	2	15	17
Eastern (Dist. 5 & 6)	19	6	1	12	102,677	167	176	0	0	0	8	8	5	0	3	47	55
Gulf Coast (Dist. 2 & 3)	53	32	4	17	352,865	625	548	1	0	1	12	14	15	8	11	157	191
Southwest (Dist. 1 & 4)	51	31	3	17	230,282	580	597	2	2	0	10	14	14	11	11	161	197
Louisiana	85	54	4	27	624,207	754	566	5	1	1	9	16	28	12	7	66	113
Northern	29	20	3	6	72,566	386	260	0	0	1	3	4	4	0	1	21	26
Southern	56	34	1	21	551,641	368	306	5	1	0	6	12	24	12	6	45	87
Arkansas	8	5	0	3	35,310	161	103	1	0	0	0	1	7	0	0	20	27
Mississippi	6	2	0	4	40,323	79	80	0	0	0	1	1	2	0	0	27	29
Southeastern States	3	0	0	3	24,305	28	30	0	0	0	3	3	1	0	1	22	24
Montana	6	3	1	2	20,291	64	90	0	0	0	2	2	1	0	0	21	22
Wyoming	24	15	1	8	115,320	336	130	0	0	0	4	4	11	0	2	43	56
Colorado	28	7	3	18	153,118	248	112	0	0	0	11	11	9	0	0	94	103
Utah	0	0	0	0	0	15	18	0	0	0	0	0	1	0	0	7	8
New Mexico	13	6	4	3	78,455	277	295	0	0	0	2	2	5	0	1	37	43
California	50	36	2	12	219,475	531	561	3	0	1	12	16	19	0	5	112	136
North Dakota	6	6	0	0	51,894	49	58	2	0	0	0	2	3	0	0	12	15
Miscellaneous	0	0	0	0	0	50	13	0	0	0	0	0	0	0	0	7	7
Total United States	988	571	70	347	4,147,332	11,488	10,038	32	3	8	154	197	305	35	74	1,852	2,266
Total previous week	1,029	593	73	363	4,070,470			34	2	6	149	191	273	32	66	1,698	2,069
Total March 21, 1953	856	441	72	343	3,539,118			22	2	10	169	203	304	22	81	1,906	2,313

Service wells included: *19, †2, ‡1, §11.

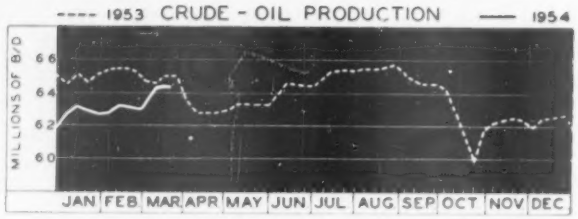


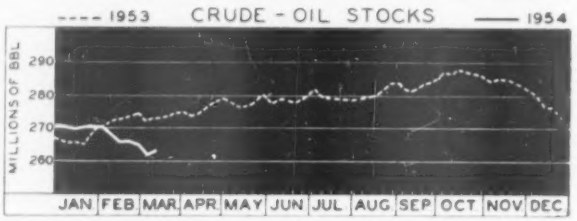


DAILY AVERAGE PRODUCTION FOR WEEK

	March 20			Mar. 13
	Crude oil	Lease condensate	Total	total
Alabama	4,200		4,200	4,300
Arkansas	74,650	600	75,250	75,500
California	996,200		996,200	997,500
Colorado	114,700		114,700	115,600
Eastern	54,500		54,500	58,000
Florida	1,475		1,475	1,475
Illinois	174,100		174,100	175,000
Indiana	30,400		30,400	30,600
Kansas	325,600		325,600	322,500
Kentucky	34,400		34,400	34,400
Louisiana	643,400	48,800	692,200	692,100
North	108,400	3,800	112,200	112,100
South	535,000	45,000	580,000	580,000
Michigan	33,900		33,900	33,300
Mississippi	88,350	4,000	92,350	92,150
Montana	29,800		29,800	30,700
Nebraska	18,800		18,800	18,900
New Mexico	205,900	1,675	207,575	207,475
Oklahoma	516,100		516,100	517,400
Texas	2,730,000	53,000	2,783,000	2,783,000
Dist. 1	43,500	575	44,075	44,075
Dist. 2	144,300	7,900	152,200	152,200
Dist. 3	424,700	25,000	449,700	449,700
Dist. 4	253,700	6,200	259,900	259,900
Dist. 5	47,600	450	48,050	48,050
Dist. 6	117,300	5,800	123,100	123,100
East Texas field	242,000		242,000	242,000
Dist. 7-B	135,400	75	135,475	135,475
Dist. 7-C	175,700	4,750	180,450	180,450
Dist. 8	868,700	1,600	870,300	870,300
Dist. 9	192,000	600	192,600	192,600
Dist. 10	85,100	50	85,150	85,150
Utah	4,400		4,400	4,300
Wyoming	231,800		231,800	231,200
North Dakota	14,500		14,500	14,400
Total U. S.	6,327,175	108,075	6,435,250	6,439,800
Change from previous week, down			4,550	
Canada	204,475		204,475	229,700
Total U. S. production January 1-March 20			500,634,950 bbl.	
Same period last year (crude plus cond.)			*517,761,240 bbl.	

*Includes 7,380,550 bbl. condensate.



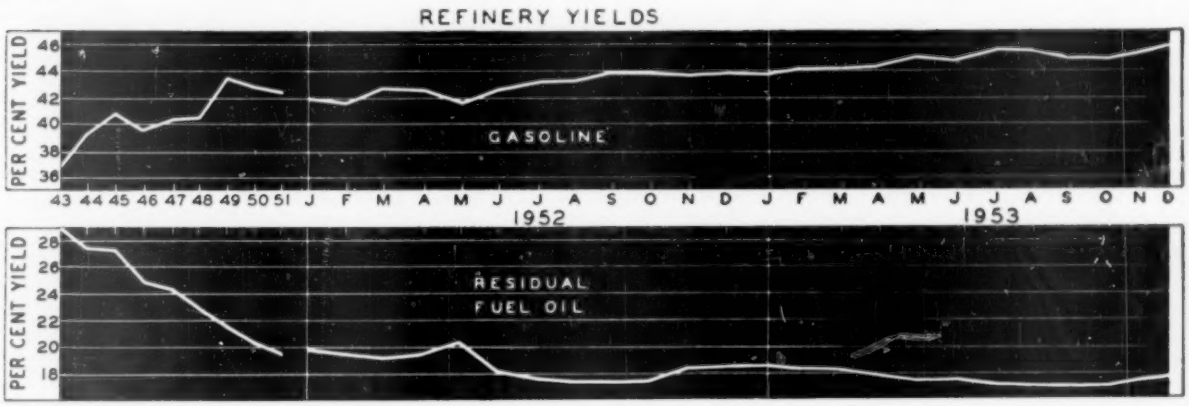


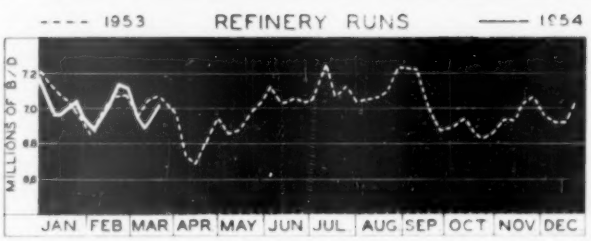
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

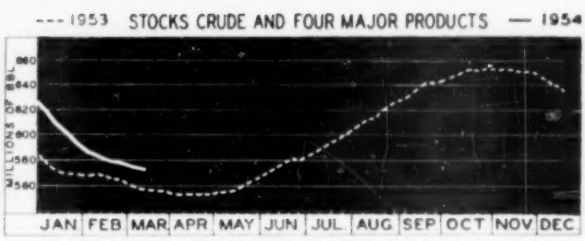
(Thousands of barrels)

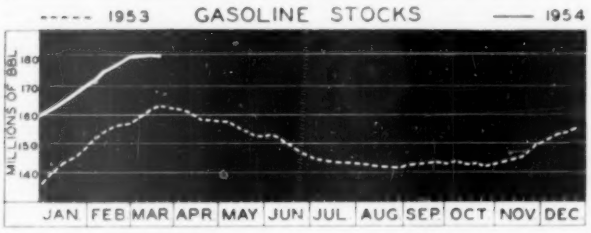
	Mar. 13, '54	Mar. 6, '54	Mar. 14, '53
Pennsylvania Grade	2,751	2,709	2,290
Other Appalachian	1,709	1,648	1,959
Illinois, Indiana, Michigan	11,549	11,695	10,755
Arkansas	3,061	3,124	2,821
Louisiana	14,441	14,427	16,972
North	2,620	2,646	3,267
Gulf	11,821	11,781	13,705
Mississippi	3,271	3,329	3,797
New Mexico	7,051	7,539	7,391
Oklahoma and Kansas	36,678	35,689	36,627
Texas	120,130	119,626	134,301
East Texas	10,448	10,782	10,983
West Texas	51,513	50,844	64,674
Texas Gulf	24,932	25,049	25,746
Other Texas	33,237	32,951	32,898
Rocky Mountain	16,887	16,590	15,759
California	34,032	34,061	32,869
Foreign	†11,614	11,497	7,816
Total	273,174	261,934	273,357

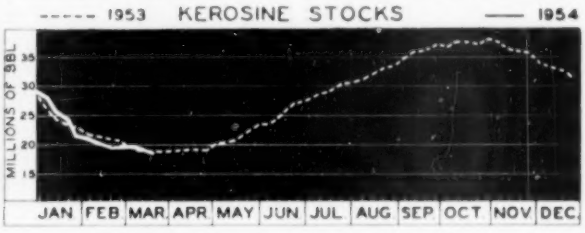
*Bureau of Mines. †Includes 2,816,000 bbl. in California.

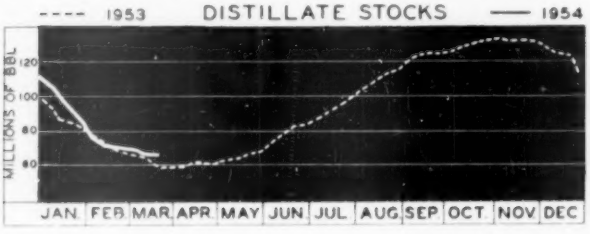


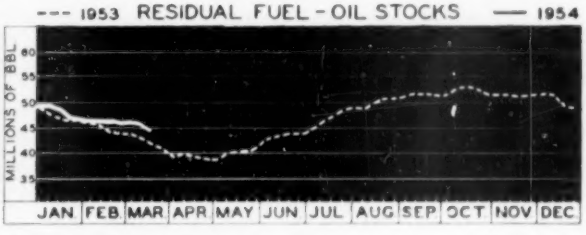










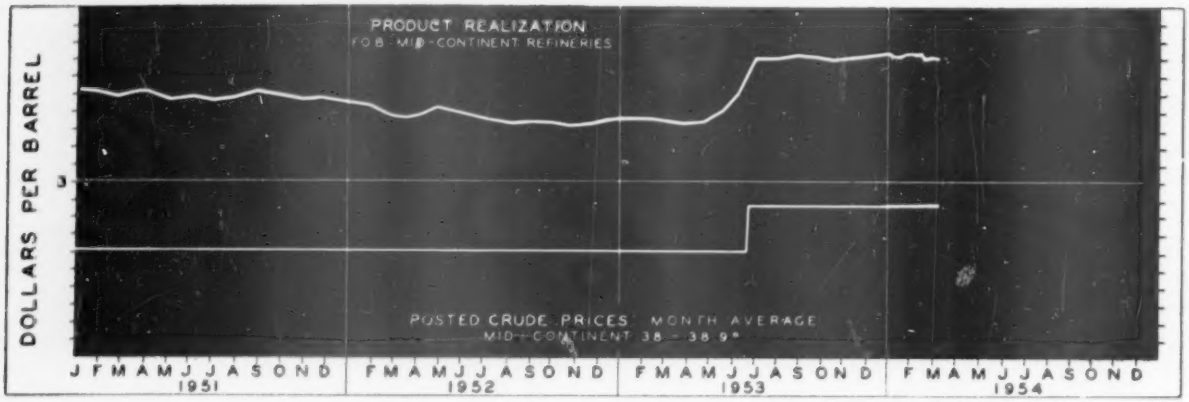


A.P.I. REFINERY REPORT, MARCH 20

(Thousands of barrels)

District—	Daily avg. runs	Daily average production* Gaso.	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, March 1953 Daily avg. runs	Daily average production* Gaso.	Kero.	Dist.	Resid.
East Coast	1,074	432.0	29.7	293.2	207.7	35,554	7,850	22,360	9,013	1,044	398.9	36.4	258.5	233.0
Appalachian:														
District 1	95	41.1	3.7	25.4	9.7	4,457	413	992	571	108	43.4	6.6	20.1	15.3
District 2	96	53.4	7.7	15.4	18.1	2,281	347	466	273	96	47.2	7.0	15.4	16.0
Ind., Ill., Ky.	1,271	654.9	63.6	252.3	173.3	39,922	3,738	9,727	4,363	1,241	657.0	71.1	218.0	164.3
Okla., Kans., Mo	596	349.2	21.4	142.4	40.6	19,849	1,159	6,552	1,197	576	334.7	13.0	132.7	58.0
Inland Texas	242	149.1	11.0	34.7	23.1	7,120	284	994	1,243	254	164.2	12.3	44.3	33.4
Texas Gulf Coast	1,718	796.4	149.9	389.7	233.6	24,216	2,313	6,013	4,540	1,779	798.2	145.4	428.1	248.1
La. Gulf Coast	553	260.8	33.0	157.7	54.0	10,151	999	2,713	1,095	534	269.4	51.3	141.4	49.4
N. La. and Ark.	94	37.3	8.4	25.7	6.6	4,032	419	983	89	79	31.5	7.5	17.6	6.8
Rocky Mountain:														
New Mexico	17	11.4		2.9	2.7	195		50	36	18	10.7	0.5	2.7	2.4
Other Rocky Mtn.	249	119.9	3.6	52.9	41.4	8,236	169	1,882	721	230	106.3	2.4	50.6	42.3
California	1,008	445.9	5.9	144.6	389.0	23,386	359	10,609	21,366	1,043	457.6	5.7	159.5	385.1
Mar. 20, 1954	7,013	3,351.4	337.9	1,536.9	1,199.8	179,399	18,050	63,341	44,507	7,002	3,319.1	359.2	1,448.9	1,255.9
Mar. 13, 1954	6,883	3,330.4	394.9	1,445.1	1,194.6	179,583	19,020	65,574	45,973					
Mar. 21, 1953	7,099	3,322.3	409.4	1,476.8	1,277.7	163,324	18,492	59,751	41,844					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES, MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953
F M A M J J A S O N D
1954

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.69 for week ended March 13, $3.71 for previous week, and $3.34 for March 1953. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of March 24, 1954. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for resident fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.75-11	11.5-12.25	9.5-10
Premium gasoline	11.75-12	13.25-14	11.25-12.25
42/44 w.w. kerosine	9.125-9.375	10.2-10.4	9.5-9.75
No. 2 straw fuel oil	8.25-8.375	9.2-9.4	8.5-8.75
No. 6 residual	$1.20-1.30	$2.20-2.40	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	-5.0	4.5	4.75
Grade 18-55	6.0	5.5	5.75

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12.5
750 vis., No. 3-4 neutral	15.5
2,000 vis., 5-6 neutral	17

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19
200 vis., No. 3 neutral, 0-10 pp.	14.25

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	18.5
180 vis., 10 p.t. neutral	22.5

WAX

Mid-Continent

132-134 A.M.P.	6.0

RESIDUAL fuel is reported to be moving to the Gulf Coast from the Mid-Continent area. This movement acts as a relief valve for the pressure on the market in the Mid-Continent where small increases in refinery stocks of residual have abnormal effects on prices.

The normal cargo quotation for residual on the Gulf Coast is $1.85 a barrel, but prices paid for heavy fuel moving into terminal storage range from slightly under $1.70 to about $1.75. Since transportation costs from the Group 3 area take about $.70 of the total, the net to the shipping Mid-Continent refiner is about $1.00.

Normal movements of residual out of the Mid-Continent to consumers in the states to the north may net the refiner about $1.20 a barrel but current demands are not high enough to prevent stock accumulations in the Mid-Continent. Northern shipments of residual out of the Mid-Continent increased contraseasonally in the late spring and summer months last year. The high demands lasted through the fall and early winter months, but spot sales have dropped off decidedly since January.

Regular gasoline on the Gulf Coast continues as the softest product market in the country. Gasoline, testing 87 octane, is available at 9.5 cents a gallon with 83-octane fuel quoted at 9.25 cents. Premium fuels were not reduced at the time of the first big cuts for regular since the suppliers who were forced to move some regular at distress prices did not have a surplus of premium grade. However, recent reports indicate slightly lower quotations for premium grades by a few suppliers.

Esso Standard Oil Co. announced a reduction in kerosine and distillate prices in New York and some New England points. The company said that the reduction is to meet competition. New prices for barge delivery in New York Harbor are 9.2 cents and 10.2 cents for No. 2 fuel and kerosine respectively.

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast ‡Includes New Mexico Permian.

Prices East of California effective June 15, 1953; California prices effective February 16, 1953. Pennsylvania Grade prices effective January 1, 1954.

FLAT CRUDE PRICES

Representative posted schedules per barrel

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.76
Middle District	3.70
Southwest Pennsylvania	3.31
West Virginia	3.25
Ohio	3.24
Illinois Basin	3.02

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$14.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EQUIPMENT FOR SALE

EVERYTHING in new and used equipment for well drilling. Fishing tools rented. Save money, get quotations from Pressey & Son, Pueblo, Colorado.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C.; 2 unused, 1 slightly used. 11-Sperry 18" by 18" cast iron Filter Presses, 11 chambers. Consolidated Products Co., Inc., #65 Garden Street, Hoboken, N. J. N. Y. Tel.: BArclay 7-0600.

WORTHINGTON ENGINE

415 HP, 360 RPM, Model DD 5, 5 cylinder, 4 cycle, Diesel and Gas. 13¼" bore, 17½" stroke. Completely rebuilt and guaranteed.

MANUFACTURERS EQUIPMENT CO.
1878 E. 18 St., Cleveland, Ohio

SACRIFICE

8 NEW
Westinghouse VHS Motors
100 hp. explosion-proof

Nationally known manufacturer purchased these motors for a project which was cancelled. For attractive price and full data, write

Box G-992
The Oil and Gas Journal
Tulsa, Oklahoma

New Steel Pipe

BELOW MILL PRICE

7" O.D.	.317 wall	200 feet
8⅝" O.D.	.352 wall	500 feet
9⅝" O.D.	.385 wall	2,000 feet
16" O.D.	.375 wall	1,460 feet
20" O.D.	.281 wall	1,300 feet
24" O.D.	.281 wall	720 feet
24" O.D.	.406 wall	920 feet
26" O.D.	.281 wall	1,100 feet
26" O.D.	.312 wall	820 feet
26" O.D.	.500 wall	120 feet

All 40 foot lengths
Electric Weld Rejects
Special Low Price

For Immediate Delivery
Write—Wire—Phone

SONKEN - GALAMBA CORPORATION
2nd and Riverview (X-128)
Kansas City 18, Kansas
ATwater 9305

EQUIPMENT FOR SALE

PUMPS FOR SALE at Seminole, Oklahoma; 4 Gould's Figure 1671 Vertical Triplex Pumps, 90, 120 Bbl. per hour, 650# to 800# Pressure, $500 each. Joe A. Huitt, Deep Rock Oil Corporation, Tulsa.

FOR SALE: Small rotary rig mounted on tandem truck. 54 ft. mast derrick type, 2200 ft. of 2⅞ inch I.F.E.U. drill pipe, two (2) mud pumps, dog house, tool box, water tank, oil field truck and trailer. Complete rig ready to work. Good for shallow wells up to 2500 ft. For information P. O. Box 643 or phone 2238, Coleman, Texas.

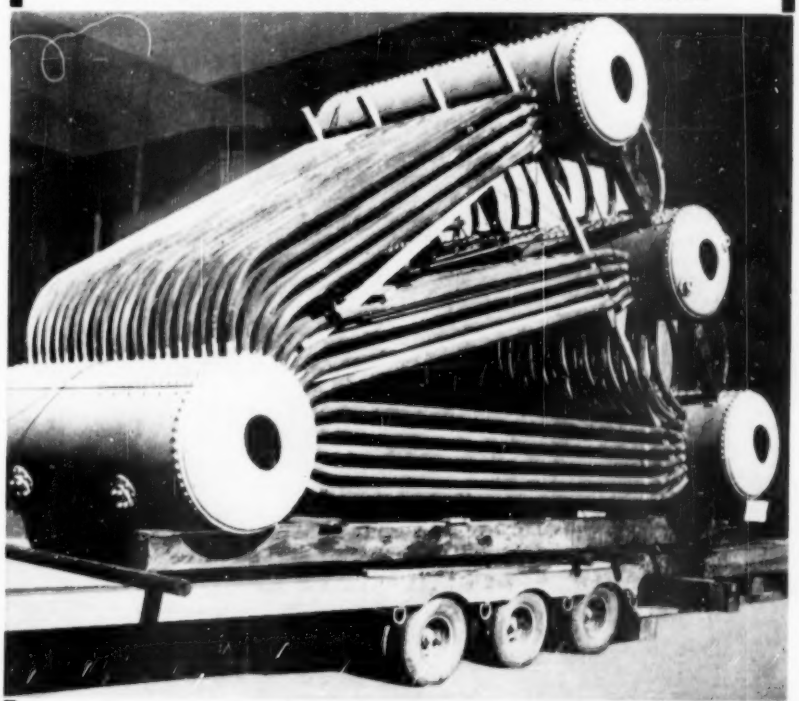
EQUIPMENT FOR SALE

250,000 FT. 8⅝ o.d. pipe with collar and plain end. $1.00 per foot Oklahoma. Rogers & Lundquist, 620 Wright Building, Tulsa, Okla. Phone 3-2072—5-8850.

TWO R.L. CARDWELL DOUBLE-DRUM SPUDDERS with 85-ft., 4-leg masts, one with 185 hp. W.A.K. and other with 145 hp. G.A.K. Waukesha motor. Draw works and motors recently overhauled. Each has 9,000 ft. ¾ in. line and 8,000 ft. ⅝ in. line. Dog houses, small tools. S. R. Lesseig, GA 71932 or P.O. Box 6206, Okla. City, or W. D. Cunningham, 89K4, Alma, Okla.

FOR SALE • 24 BOILERS • FOR SALE

BABCOCK & WILCOX, STIRLING TYPE
ASME CODE — NATIONAL BOARD REGISTERED



16—777 HP (7,777 sq. ft. of heating surface).
8—850 HP (8,500 sq. ft. of heating surface).

All boilers are 4-drum, for 225# operating pressure, equipped with standard superheaters, designed for 128° F. superheat or a total of 525° F. Standard auxiliaries.

NATIONAL METAL & STEEL CORP. Dept. OJ, Terminal Island, (Los Angeles Harbor), Calif.

Phone: NEvada 6-2517

EQUIPMENT FOR SALE

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FAILING model heavy duty 1500 drill and water truck. Write to Box 819, Longmont, Colorado, for details.

SEVERAL FAILING MODEL 1500 rigs, various ages, conditions and inventories. P. O. Box 643, Billings, Montana.

FOR SALE: Two 18-trace sets of Reflection Seismograph instruments, Rack and Panel mounted. One set mounted in instrument cab, on 1951 GMC Truck, model 301-24. Very reasonably priced. Texas Seismograph Co. Box 2069. Phone 3-1493. Wichita Falls, Texas.

TWO N-K WAUKESHA DRILLING ENGINES. A-1 condition guaranteed. Skid mounted for U-15 draw works. Wallace Engine & Supply. Phone ME 71988, 1915 S.E. 29th, Oklahoma City.

FOR SALE: 1 Wilson Super single drum Swab and Tubing Unit; 10½ x 8½ ft. mast; Tools and lines mounted on K7 International Truck, no junk. Phone 6-5684, Odessa, Texas.

FOR SALE: 23,000 ft. new 1½" .85# Black T&C Standard Pipe while it lasts at 6c per foot. 15,000 ft. New 6⅝" O.D. 18.97# DRL Electric Weld P.E. Line Pipe, Bev. Large stock used casing and tubing. Box H-105, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 10,341 ft. new 2⅜-in. drill tubing, 6.26 lb., J-55, E.U., Pittsburgh Acme, six-thread, with 500 N-80 couplings. Diamond Drilling Co., 2759 East Willow, Long Beach, Calif.

FOR SALE: ENGINE—165 Hp. Climax T-61 on Skid. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

REED WIRE Line Core Barrel complete with accessories for use with 4½" drill pipe. Practically new. $1,000.00. Carbons Consolidated, Inc., P. O. Box 2927, Monroe, Louisiana.

FOR SALE: Cardwell RL double-drum spudder complete with tools, now working in Oklahoma, also Hydraulic casing pulling machine complete with tools. Phone ME 7-2242, Oklahoma City, Oklahoma.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

EQUIPMENT WANTED

WANTED: Complete Rotary Rig, U 15 or National 50 Class, preferably located in West Texas. Box H-106, The Oil and Gas Journal, Tulsa, Oklahoma.

NOTICE: We buy, We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WANTED: Used 5 x 8 horizontal, single action, Triplex power pump. Please state make and condition. Acid Engineers, Inc., Lakin, Kansas.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

EQUIPMENT WANTED

WANTED IMMEDIATELY: Ductility machine, penetrometer, and other asphalt lab equipment. Box H-122, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: A complete up-to-date Rotary Drilling Rig with portable mast, but less drill pipe, capable of drilling to 5000 ft. with 4½" pipe. Write giving all details, location and price. Box G-995, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

ENGINEER with structural experience and some knowledge of drilling equipment or methods desired by recognized oil field equipment company for contact work and sale of derricks and all related drilling structures. Box G-990, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Energetic, conscientious, economy-minded, capable petroleum engineer as production superintendent for well-established independent company. Experienced in completing, equipping, drilling practices, taking BHP and OGR tests. Prefer man who has been employed by independent company. Excellent opportunity for one with real ambition and free to travel Mid-Continent area. Replies strictly confidential. Give complete data and salary expected. Box H-119, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM OR RESERVOIR ENGINEER

With minimum 3 years' experience in development, production and oil and gas reservoir engineering on primary and secondary recovery problems. For New York office of major foreign producer. Write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR BOX OGJ-7

Arabian American Oil Company

505 Park Avenue
New York 22, N. Y.

METAL INSPECTOR

An opportunity is open for a Metal Inspector, to take charge of Metal inspection program at our Sarnia, Ontario, refinery.

Engineering degree not essential but applicants must have several years' experience in inspection of refinery process equipment.

Write giving age, education, full details of experience, and salary expected.

Canadian Oil Refineries Limited,

CORUNNA, Ontario, Canada

HELP WANTED

WANTED: Experienced Hydraulic Casing Pulling Unit Operator. Write P.O. Box 221, Great Bend, Kansas. State qualifications.

OIL INDUSTRY Employment Service, Tom Robinson, owner, 405 Tuloma Bldg., Tulsa, Oklahoma. For technical and trained oil industry personnel. Write for blank.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

WANTED, GAS ENGINEER, must have college degree and at least 7 years experience gas and oil production, treating and transmission. Independent Producer, East Texas. Box H-118, The Oil and Gas Journal, Tulsa, Oklahoma.

PHOTOGEOLOGIST—To head photogeolic interpretation section. Must be College graduate—5 years experience—mining experience desirable. Write giving age, education and full details of experience. All replies confidential. Box G-968, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL SECRETARY: Age 35 to 50, for independent oil company in Okla. City. Must be expert Stenographer, well experienced in oil production and operations. Excellent salary with raises commensurate with ability. Give references. P. O. Box 1824, Oklahoma City, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

GEOLOGIST

Excellent permanent position available for thoroughly experienced petroleum geologist. Requires degree in geology and from 8 to 10 years of geological experience. Age 30 to 40. We offer a full program of employe benefits. Apply by mail to:

SOUTHERN UNION GAS COMPANY
Burt Building
Dallas 1, Texas
Attention: Mrs. Singer

SITUATIONS WANTED

GRADUATE Petroleum Production Engineer, twelve years major company experience in oil and gas production. Interested in connection with independent. Will consider part-time employment on retainer basis if location within 100 mile radius Norman, Oklahoma. Details of experience and references given on personal interview. Reply to P. O. Box 68, Oklahoma City, Oklahoma, attention Mr. Wingo.

Experienced oil company manager desires position with independent group. Technically trained, under 40, experienced in all phases of exploration and development of oil and gas properties. This includes unitization, plants, pipe lines, financing. Presently employed as manager. Box H-108, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUFACTURERS' REPRESENTATIVE

Covering Southern Oklahoma and North Central Texas, desires additional accounts in oilfield production and drilling equipment. Reply—

Box H-101
The Oil and Gas Journal
Tulsa, Oklahoma

SITUATIONS WANTED

GEOPHYSICIST: Seven years seismograph experience, age 30, family. Box G-986, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 31, married, B.S. Degree Texas A & M College, 5 years' experience in Gulf Coast and Venezuela. Exploration, exploiting, reservoir and regional studies, reserve estimates and administrative background. Foreign or domestic operations. Box G-964, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION INDEPENDENT PRODUCERS: Has the gas-natural gasoline aspect of your business grown big enough to need expert attention? Registered chemical engineer, 42, presently gasoline plant superintendent, has the technical and business sense to do the job. Box H-125, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY EQUIPMENT Inspector, Thermal, Catalytic, Platforming. Varied Refining Experience. Box H-124, The Oil and Gas Journal, Tulsa, Oklahoma.

WELLSITE GEOLOGIST, experienced in structural geology, core analysis, logging, regional studies, micropaleontology, desires responsible position with independent company. Box H-120, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER: Graduate U. S. Naval Academy—Also Master Civil Engineer. Age 30. Aggressive, personable. Extensive civilian and military supervisory engineering and financial experience. Desire position in production or sales where ability and drive will pay off. Box H-123, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—Presently employed by major oil company, 6 years varied experience—production, equipment, drilling, completions, remedial work. Desires position with progressive independent or individual. Some field work preferred. Box H-126, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED drilling, completion, production superintendent available for progressive organization. Engineering graduate, 7½ years major company experience. Age 37, married. Box H-112, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED GRADUATE PETROLEUM ENGINEER desires responsible position with aggressive independent or individual in Rocky Mountain region. Box H-127, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—Independently operative in Central and Eastern Oklahoma. Has up-to-date subsurface structural mapping system and records available for checking merit of leased acreage and recommendation of preferred locations for oil exploration. Salary or retainer. Post Office Box 1884, Tulsa.

Excellent opportunity for operator or group, seeking geologist to represent them in Central and West Texas. Thoroughly competent and experienced geologist available for headquarters in Abilene, Texas. Investigation and references excellent. Price's Oil Executive Personnel Agency, 239 White Building, Abilene, Texas.

WANTED IN CANADA

EXPERIENCED MAUFACTURER REPRESENTATIVE IN CANADA DESIRES ADDITIONAL ACCOUNTS. MANUFACTURERS NOW REPRESENTED INCLUDE GRAY TOOL CO. AND VENTURA TOOL CO. BEST OF REFERENCES.

LEIDECKER TOOL CO. LTD.
6921 104TH STREET
EDMONTON, ALBERTA CANADA
PHONE 35016

SITUATIONS WANTED

NATURAL GAS & PETROLEUM ENGINEER, 29, six years varied experience in production, completions, reserves, unitization, repressuring, cycling & plant operation. Desire connection with independent or consultants. Box H-115, The Oil and Gas Journal, Tulsa, Oklahoma.

MALE SECRETARY: Single, four years' experience, college graduate, willing to travel U.S. or overseas. Box H-123, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 628, Ph. No. 3-3141, Hobbs, New Mexico.

AVAILABLE: 25 years experience purchasing agent and warehouse superintendent experience Middle East, South America and Canada. Refinery and pipe-line work preferred. Box H-103, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

FOR SALE MAPS

RAND-McNALLY U. S. SURVEY MAP Combined with Pronto Land Measure land description work aid charts. 17x22 inches, printed two sides—crammed full of practical land measure information. Compiled and published by repeated requests from our customers all over the United States. Invaluable for a better working understanding of the Rectangular Survey System. No other like it! Mailed first class mail, for only $1.00. Money back if you are not satisfied. PRONTO LAND MEASURE, 510 Sill Building, Flint, Michigan.

WANTED

WANTED: STRIPPER PRODUCTION, Bartlesville sand, for water flood. Southeastern Kansas. Please give full information. Box G-996, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

20 SECTIONS OWNED, 10 sections leased. Southeastern Colorado. Good improvements, not leased for oil. 24 inches snow, exchange for farm land or producing royalties. Ranch is clear. Price $260,000.00, give or take difference, immediate delivery. S. K. Roach, Groom, Texas. Phone 3721.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

BUSINESS OPPORTUNITIES

HAVE GOOD 6,000 ft. Rotary Rig. Will consider working interest to party who can keep it working. State proposition. Box H-102, The Oil and Gas Journal, Tulsa, Oklahoma.

ELECTRICAL CONTRACTORS

Office Phone 5-5315 — **Res. Phone 7-4950**

W. L. RATCLIFF COMPANY
ELECTRICAL CONTRACTORS
Industrial—Commercial—Distribution

W. L. Ratcliff — **506 Caddo St.**
P. O. Box 373 — **Shreveport, La.**

ROYALTIES

OFFERING CHOICE ROYALTIES on geology in Oklahoma's greatest oil fields. A. S. Berry, 522 Wright Bldg., Phone 5-5402. Tulsa, Oklahoma.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

80½ ACRES producing royalty under 322 acres in the Bronte field. Twelve wells. For full particulars call or write Joe Carter, Bronte, Texas.

FOUR PRODUCING, paying leases for sale, old production. Will react to secondary recovery methods. H. A. Miller, Glasgow, Kentucky.

FOR SALE: 232 acre oil and gas lease, 10 year term, Shelby County, Texas, well located, a good buy, $5.00 per acre. Write C. A. Parker, Box 507, Center, Texas.

WANTED: Small blocks, oil, gas leases, for secondary recovery. Box G-954, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTRACTIVE OIL & GAS LEASE in Southeastern New Mexico. 120 acre State lease—1961 expiration—includes SW/4 NW/4 Sec. 36-6S-30E Chaves Co., SW/4 NW/4 Sec. 27-6S-34E Roosevelt Co., NW/4 SW/4 Sec. 26-19S-27E Eddy Co. First reasonable offer accepted. Box H-113, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 320 acres, small Hunton well, Nemaha County, Kansas. Thousand acres offset leases. Sell or farm out cheap. R. D. Swan, Daniel Bldg., Tulsa.

FOR SALE: Attractive surface structures in Overton County, Tenn. Seven sands above 1600 feet. Seven rigs drilling in adjoining county. N. M. Sauls, Geologist, Cookeville, Tenn.

WILL pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

SEE A. L. BOWLES, Box 947, Ada, Okla., for attractive drilling deals and producing royalties.

LEASES AND DRILLING BLOCKS bought and sold, all areas in Southwestern States. D. W. Burkett, 3455 Johnette, Shreveport, Louisiana.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
5635 Delmar Ave., St. Louis 5, Mo.

PRODUCTION FOR SALE

PRODUCTION

Aux Vas Sand Southern Illinois near Fairfield. Over 600 barrels per day settled production, brought in past 18 months. Property can be delivered clean and clear intact. Authorized engineering reports will be submitted to principals only or authorized agent. Prompt reply to inquiries.

Box H-121
The Oil and Gas Journal
Tulsa, Oklahoma

EQUIPMENT MEN
. . . in the News

Executive Changes Made By Fluid Packed Pump

J. R. BRENNAN

J. M. McFADDEN

Sidney Shuman, executive vice president of Fluid Packed Pump Co., has announced the following executive appointments:

John R. Brennan has been promoted from sales engineer to chief engineer. In his new capacity he will have full responsibility for all phases of company engineering and assist the manufacturing and sales departments in furthering the development and sale of Fluid Packed Pump products. Brennan is a graduate of Oregon State College with a degree in chemical engineering. Before joining Fluid Packed Pump in 1948, he spent 11 years with Union Oil Co. as a field engineer and production foreman.

James M. McFadden has joined the company as controller. A graduate of University of California, McFadden has a thorough knowledge of the oil-tool business, having worked in a pump-company store and a manufacturing plant before entering the accounting field. Prior to coming to Fluid Packed Pump, McFadden was treasurer and controller of Axelson Manufacturing Co.

Southern Engine & Pump Promotes Reynolds

R. H. (Dick) Reynolds has recently been appointed manager of Southern Engine & Pump Co., in Lafayette, La. Reynolds is a mechanical engineer, and is a graduate of University of Houston. He joined Southern Engine & Pump in 1952, and served with the Houston office in the engineering department prior to transfer to Lafayette.

This office will specialize in engineering and furnishing Peerless and other nationally known pumps, Le Roi gas-gasoline engines, Nordberg diesel engines, and custom-built generating sets and pumping units.

Volotko Made Field Salesman

TONY VOLOTKO

Tony Volotko has been named field salesman for Mission Manufacturing Co. in the Houston district, W. T. Campbell, executive vice president of Mission has announced.

Volotko came up through the ranks since going to work in the Mission shop in 1938. His shop experience includes work in all departments including tool making. In 1947 he was selected for the job of junior field service man. He was made senior service man in 1951, and held that position until his appointment.

Wilson Named Advertising Manager by Magcobar

TOMMY WILSON

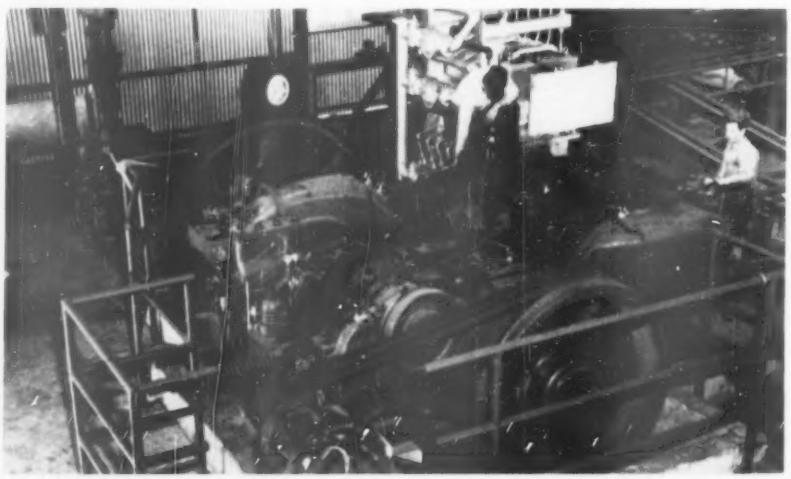
The appointment of Tommy Wilson as advertising manager of Magnet Cove Barium Corp., has been announced by Williard M. Johnson, president of Magcobar.

Wilson joined the advertising department of Magcobar in 1953. He received his B.S. degree in journalism from University of Arkansas in 1951.

Harbison-Fischer Names McDonald to East Texas

Harbison-Fischer Manufacturing Co., Fort Worth, has announced the appointment of W. N. (Bill) McDonald as a sales representative for the company in East Texas. His headquarters are in Kilgore. McDonald joined Harbison-Fischer after working several years as field representative for Superior Iron Works & Supply Co. and Bethlehem Supply Co. in Magnolia, Ark.

Atlas Installs Equipment for Upsetting Large Pipe



Atlas Pipe, Inc., has announced the installation of a forging machine weighing 70 tons at its Houston plant for upsetting steel tubular goods for the oil and gas industry. Prior to adding this machine, Atlas was able to upset only oil-well tubing, whereas this forging machine enables the firm to upset tubing, drill pipe, and casing through 5½-in.-o.d. sizes. This new forge shop and new equipment is part of an investment of $150,000 made to furnish pipe-finishing facilities previously available only in the East. Since beginning in 1950, Atlas Pipe, Inc., has continued to expand so that it now includes a shop and pipe yard at Corpus Christi, Tex., and pipe stocks at Odessa, Tex.

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WILDCAT COMPLETIONS

(Continued from page 180)

Kern County: McMullen & Grother 16-20 Bates estate, 20-25s-19e. Dry. TD 1,593 ft.

Richfield Oil Corp. 58-20 Richfield-C.C.M.O., 20-11n-22w. Dry. TD 6,860 ft.

C. E. Zillgitt 2-22, 22-9n-17w. TD 2,385 ft.

Kings County: Brookline Oil Co. 3 Travma, 8-24s-18e. Dry. Deepened from 905 ft., TD 4,085 ft.

Franco-Western Oil Corp. 1 Norris Orchard, 33-24s-18e. Dry. TD 948 ft.

Norris Oil Co. 52-29 Oceanic-Baylis, NW NE 29-24s-18e, IPP 95 BO in 18 hours, 12/84-in. choke, 39° gravity, perfs. 3,330-3,480 ft., TD 4,514 ft. (Extension to Orchard pool of Pyramid Hills field.)

Los Angeles County: Ebert & Nepple 1 Community, 30-4n-15w. Dry. TD 2,830 ft.

Standard Oil Co. of California 2-A Mission-6, 2-2n-16w. Dry. TD 8,782 ft.

Merced County: Richfield Oil Corp. 1 Virginia Smith, 13-6s-14e. Dry. TD 1,928 ft.

Orange County: J. B. Crawford 1 Huntington, 11-6s-11w, IPF 210 BOPD, 27/64-in. choke, 27.6° gravity, 150 psi. tubing pressure, perfs. 5,271-92, TD 6,171 ft. (New Miocene sand pool in Huntington Beach field.)

Western Gulf Oil Co. 1-A Y.L.U.A., 22-3s-9w, IPP 18 BO in 18 hours, 13.9° gravity, perfs. 308-499 ft., TD 504 ft. (New shallow zone in Yorba Linda field.)

Sacramentto County: Rio Hondo Oil Co. 1 Dee Community, 20-7n-5e. Dry. TD 7,200 ft.

Sutter County: Marshall Brown 1 Montana, 35-13n-3e. Dry. TD 5,738 ft.

Ventura County: M J M & M Oil Co. et al 1 Hill, 27-3n-21w. Dry. TD 6,277 ft.

MONTANA

Rosebud County, Ivanhoe: Six Hundred Oil Co. 1 Kincheloe, SE SE SE 31-12n-32e. Dry. TD 5,815 ft. in Heath.

Yellowstone County, Broadview Dome: Sheib-Berkley 1 Stoltenberg, C NW SE 18-3n-23e. Dry. TD 4,250 ft. in Mission Canyon.

WYOMING

Laramie County, North Pine Bluffs: Estate of John Black and S. D. Johnson 1 Scheel, C SE NW 21-16n-61w. Dry. TD 8,738 ft. in Morrison.

Park County, Northwest Little Buffalo basin: Stanolind Oil & Gas Co. 2 Unit, NE SE SW 34-48n-100w. Dry. TD 5,504 ft. in Madison.

Washakie County, 14 Mile Unit: Gulf Oil Corp. 1 Butler Federal, C SE NW 35-47n-94w. Dry. TD 13,184 ft. in Phosphoria.

Hidden Dome: Stanolind 1 Government, SW SW SE 29-48n-90w. Dry. TD 4,711 ft. in Madison.

COLORADO

Adams County: Eddie Fisher 1 Eichid, SW SW NW 29-1s-58w. Dry. TD 6,238 ft.

Logan County: British-American 1-B Koenig-Ashby, C SE NW 33-9n-54w. Dry. TD 5,436 ft.

British-American 1 Wright, C SW SE 15-10n-54w. Dry. TD 5,275 ft.

British-American 1 Halsey, Lot 4, Sec. 4-8n-53w. Dry. TD 5,077 ft.

British-American 1-B Colorado, C SE SE 36-9n-53w. Dry. TD 4,976 ft.

Feldt & Robinson and Don M. Rounds 1 Zeigler, C SW SW 1-6n-55w. Dry. TD 5,291 ft.

Gordon Hurd 1 State, NE NE SE 16-7n-55w. Dry. TD 5,590 ft.

Rex Monahan and H. E. Zoller 1 Mayo Head, C NE SW 27-8n-55w. Dry. TD 5,459 ft.

Morgan County: S. D. Johnson and Woodward Oil Co. 1 Good, NW NW SW 20-3n-57w. Dry. TD 5,775 ft.

Lowell & Daniels, Inc. 1 Petersen C-44, NE NW SE 31-3n-56w. Dry. TD 5,437 ft.

Washington County: Trimark Oil Co. and Twin T 1 Woodward-Petteys, SW SW SW 31-2s-56w. Dry. TD 5,460 ft.

MANITOBA

Cal Standard 1-12 South Virden, LSD 1, 12-10-26w1. Miss. oil well. TD 2,405 ft.

SASKATCHEWAN

Imperial 16-4-19-11 Indian Head, LSD 16, 4-19-11w2. Dry. TD 2,604 ft.

Palmer-California Standard 3-16 Manybone, LSD 3, 16-14-13w2. Dry. TD 5,455 ft.

Imperial 7-15-32-25 Victory, LSD 7, 15-32-25w3. Dry. TD 2,299 ft.

Rio Prado 4-34 McNutt, LSD 4, 35-25-30w1. Dry. TD 1,737 ft.

ALBERTA

Gulf 9-9 Cadotte, LSD 9, 9-86-16w5. Dry. TD 5,320 ft.

Cities Service-British American 1 Chinchaga, LSD 15, 7-110-4w6. Dry. TD 4,730 ft.

Dome Hammond 3-22 Grande Prairie, LSD 3, 22-10-6w6. Dry. TD 2,224 ft.

Spokane-Alberta Exploration 1 Naco, LSD 2, 31-39-7w4. Dry. TD 2,469 ft.

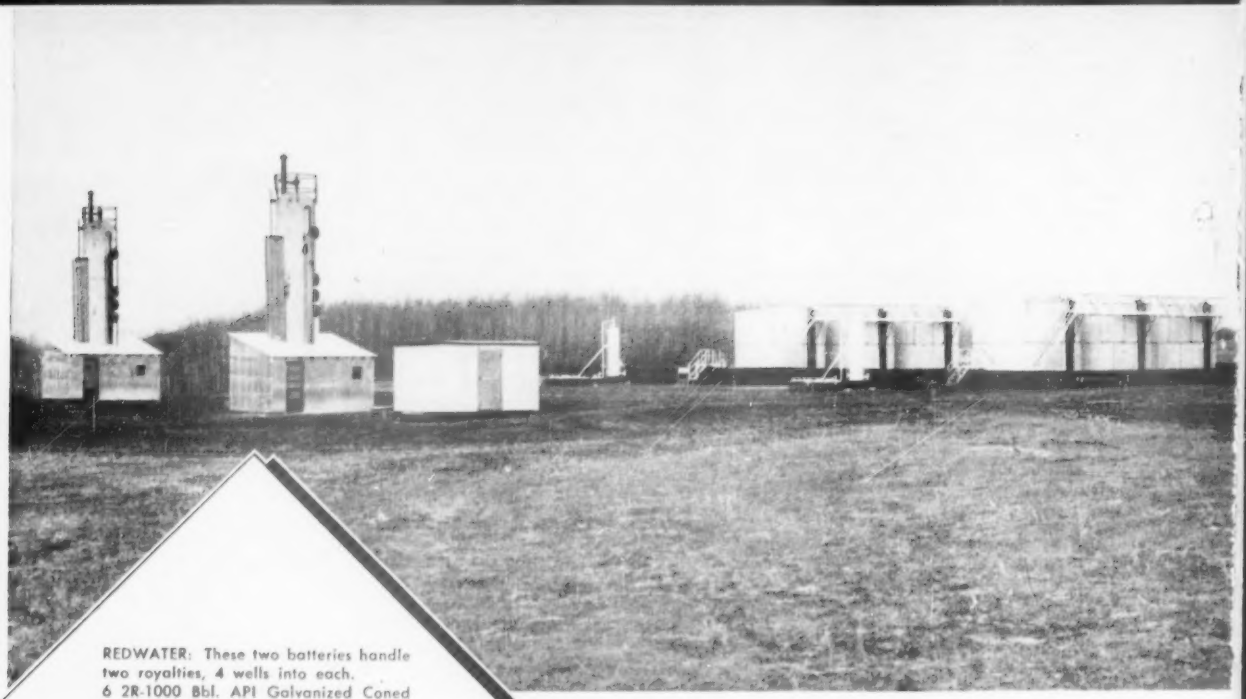
Seaboard-Great Plains-Baysel 8-35 Wolf Creek, LSD 8, 35-47-8w5. Cardium oil well. TD 5,275 ft.

Shell A-7-11 Provost, LSD 7, 11-39-2w4. Dry. TD 2,740 ft.

California Standard 16-27 Utukuma River, LSD 16, 27-80-11w5. Dry. TD 5,780 ft.

North Canadian-North Pacific 1 Whitemud, LSD 8, 16-51-25w4. Cretaceous oil well. TD 4,170 ft.

National TREATERS ELIMINATE BOILERS IN CANADIAN TANK BATTERY INSTALLATIONS



REDWATER: These two batteries handle two royalties, 4 wells into each.
6 2R-1000 Bbl. API Galvanized Coned Bottom National Bolted Steel Tanks with Aluminum Decks
2 2C, 2½' x 13' 125# National Separators
2 6' x 27½' "YCP" 15# National Emulsion Treaters

SITUATION: When National Tank first entered Canada in 1948, boilers were a "must" in all tank battery installations to maintain pour point in temperatures up to 60° below zero.

PROBLEM: Boiler installations were expensive. Water supplies were critical and because of extreme cold, continuous operation was required or careful draining of steam and water lines was necessary if lease was shut down for only a short length of time. To begin operations again meant costly refilling of water systems. Steam coils in storage tanks caused a large amount of evaporation of oil in tanks . . . as much as 3" in one 1000 Bbl. tank.

NATIONAL'S SOLUTION: Treater installation costs are about the same as boiler costs. National engineers helped their customers re-design piping hook-ups and circulating lines. They suggested putting the oil into the bottom of the tanks. In 1951, 98% of tank batteries were built with treater installations instead of boilers. Tanks have bottom fills. Pour point is maintained by circulating oil from tanks through treaters. Piping is arranged to allow hot oil to circulate through manifold, headers and separator. Treaters can be shut down for several days in extreme cold without draining water or for longer periods by draining water from treater only.

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

16-11-52

It's so much simpler just to call the HAZARD distributor when we need a new line...
Yes, it sure is, and HAZARD lines are cheaper to use if you follow their new ton-mile system
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LAY-SET
AMERICAN CHAIN
CABLE COMPANY
PREFORMED
WIRE ROPE

What do Your Lines Cost on a TON-MILE BASIS?

• You hear a lot about wire rope costs these days, particularly the first cost. But you don't know how much a line really costs you until you scrap it—and—until you figure your cost per ton-mile.

To prove the savings you get from using HAZARD LAY-SET Preformed drilling lines, HAZARD offers you a Ton-Mile Book which helps you get every last dime's worth of service. With it you can quickly check your actual cost per ton-mile and make a comparison of costs of using any other drilling line made. After using your first HAZARD line, you'll probably be surprised to find how much more the other lines have cost you.

• • •

See your nearby HAZARD distributor who stocks what you need. He's always ready to give you quick service and friendly, experienced advice on all your wire rope needs.

HAZARD WIRE ROPE DIVISION
American Chain & Cable Company, Inc.

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OFFICES AND WAREHOUSES: Odessa, Tex., San Francisco, Pittsburgh, Philadelphia, New York, Los Angeles, Denver, Chicago, Bridgeport, Conn.

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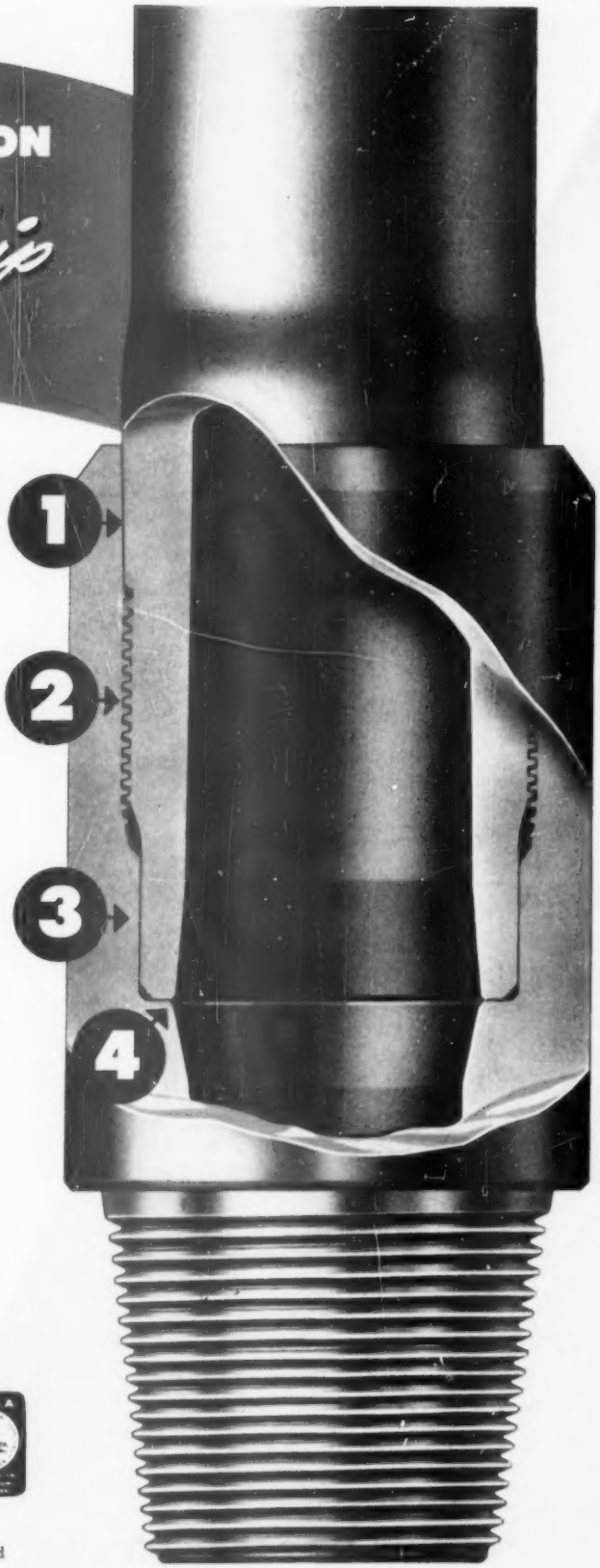
Straight Grip
TOOL JOINTS



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for positive protection against joint leakage and creep!

Use Straight Grip
for a tighter seal as pump pressures and tension loads increase!

Use Straight Grip
for replacement ease because worn joints can be removed and replaced with new, right at your rig!

Use Straight Grip
for trouble free drilling because of the four points of seal!

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